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The people of Sicily: studies of human skeletal remains and of human biology from the Paleolithic to modern times

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Summary – *The analysis of human skeletal remains continues to be an important factor in the archaeological investigations of ancient cemeteries. Studies of human remains had become progressively marginalized in many parts of the classical world during the 20th century. Recently skeletal studies have re-emerged to become of increasing importance in reconstructing the culture history of Sicily. A review of the history of osteological and related investigations on Sicily, including publications and the recent initiation of several important studies in molecular biology, demonstrates the considerable progress made in recent years. This historical overview provides future researchers with a complete bibliography as well as indications of the many possible directions in research that are now available. The enlarged and definitive list of relevant publications gathered here updates earlier reviews that had surveyed studies of Sicilian skeletal populations (Becker 1995-96, 2000a, Robb 1997, also Di Salvo and Germanà 1997). The present survey provides an historical overview together with an intellectual history, plus an indication of the extent of human skeletal material recovered from Sicilian archaeological sites of all periods up to the present. These skeletal data are incorporated into an archaeological framework with the intent of providing both the context and the background needed for future comparative studies. This survey also serves as a channel by which basic data may be located for all types of skeletal and related research pertaining to the human biology of Sicily.*

Keywords – *Human biology, Osteology, DNA, Sicily.*

Introduction

The study of human skeletons on the island of Sicily has had a long and important history (Becker 1995-96, 2000a). These skeletal studies provide information that may be placed in the context of a rich and extremely varied archaeological heritage (V. Tusa 1983, Holloway 1991, S. Tusa 1994). Bibliographies including references that reflect the work of physical anthropologists in specific parts of the world have been issued as useful research tools for more than 50 years. Wookey (1947) generated such a bibliography of works in physical anthropology specifically for South America. T. Dale Stewart (1952) focused his collection for Latin America specifically on a twelve year period (1937-1938). The bibliography that appears here for Sicily includes all of the known writings relating to Sicilian human biology, in the widest sense, from the Renaissance to the present.

Sicily, as a large island, provides the advantage to this research by having well-defined natural borders. The geographical context, therefore, provides an outstanding

location for applying modern analytical techniques from physical anthropology in attempting to solve archaeological problems. The complex prehistory and history of this island, situated at the center of the Mediterranean, includes major periods of extensive colonization by Carthaginians and Greeks, as well as a long period under Roman rule (see Fischer-Hansen 1995) as well as by Islamic and Norman rulers. Thus an integrated approach to the anthropology of the island involves interpreting geography and ecology along with prehistoric and historic archaeology as well as linguistics and demography. To these traditional approaches we now find the tools of molecular genetics of increasing value. We are only at the beginning of this new period of integration to understand the people and the past of Sicily. This work is intended to collect an overview of biological research, most of which has been focused on the presentation of osteometric data until very recently. Many scholars continue to publish important basic studies of skeletal populations from archaeological contexts. The increasing use of molecular biology in this research allows an entirely new range of questions to be asked as well as providing new means to solve old problems.

A major factor in the history of human skeletal studies on Sicily has been the divergence between biologcal concerns and Classical Archaeology. The approach to skeletal recovery by classical archaeologists during much of the 20th century shifted what had been a 19th century concern with integrating the skeletal data to a period of justified scholarly disillusion due to the lack of meaningful results from bone studies. The problems for physical anthropology that emerged during the early development of the speciality, around 1900 (cf. I. Morris 1992), have been defly summarized in a recent paper by Johannes Siapkas. "Classical archaeology is practised according to theoretical modes formulated a century ago. The research goals of classical archaeology have been preserved as opposed to developed" (Siapkas 2001). S. Dyson's 1993 observation that we are now in a particularly important period of transition in archaeological studies throughout the Mediterranean region is confirmed by important shifts in the use of specialist studies, including those concerned with human remains. For example, Francesco Mallegni and Angelica Vitiello (1997) offer a history and overview of human skeletal studies relating to the general area of Etruria as a key paper in a volume largely devoted to studies of physical anthropology in that part of peninsular Italy. Of particular importance to physical anthropologists was Dyson's note (1993: 195) that in classical archaeology "what passed for theory was often aesthetic connoisseurship." Nowhere was this more evident than in the nearly total disregard by classical archaeologists for the recovery of human skeletal remains. The approach to archaeology entirely through text interpretation or as connoisseurs of artifacts left no place for the skeletal evidence.

Despite changes in attitudes and approaches among classical archaeologists over the past decade, we continue to see the publication of traditionally structured reports. Volumes appear purporting to present the archaeology of a necropolis or a cemetery but which provide little more than lists of artifacts recovered from tombs together with relevant archaeological data (e.g. Soprintendenza 1988). In almost all of these examples the human skeletons were never recorded nor recovered from the tomb contexts from which the artifacts derived. Siapkas's (2001) important call for a discussion of these archaeological matters "in order to redefine and change the discipline" indicates hopeful trends. Siapkas's plea, however, cannot be heard by people who lack training in basic archaeological methods and theory. Dyson (1993: 196) suggested that the "great divide" in archaeological method and theory of the 1960s is long behind us. He pointed out the former disruption of "the established socio-academic order" and indicated that many of the related disciplines are beginning to move toward common archaeological goals. These goals of understanding the past through greater co-operation and multiple approaches to this single focus are indeed changing, but perhaps at a much slower pace than Dyson had anticipated.

An important component in the future of archaeology is the employment of techniques of recovery, curation, and analysis that have been perfected over the past half-century. These techniques include a specialized set directed toward the recovery,

curation and analysis (hereafter RCA) of human skeletons. The analysis of human remains from archaeological contexts primarily focuses on the determination of age and sex of individual sets of remains to provide data that are critical to the archaeological interpretation of sites, whether the micro-space of a tomb or the greater spaces of cemeteries or entire villages. The data essential for gender studies, for example (see Whitehouse 1998), may be found in the most fragmentary bits of skeletal remains. The biological data gleaned from these bits as well as from intact skeletons are absolutely fundamental in portraying the "social osteology" that has emerged in Italy recent years (see Bietti Sestieri 1992a, 1992b).

The research potential for skeletal studies on Sicily, as a specific zone of study, is considerable (Konigsberg and Buikstra 1995). Even basic research, however, is impeded by archaeologists who erroneously assume that sex can be macroscopically evaluated only from a well-preserved skeleton (see Whitehouse 2001: 51). In fact, cremated remains, partial skeletons, or even a few teeth can provide a skilled evaluator with sufficient materials by which sex can be accurately evaluated. Recent studies, however, must bear the weight of past and present realities, realities that continue to be experienced in Sardinia (e.g. Germanà 1995) as well as in parts of Sicily.

A number of interesting questions posed by biological anthropologists are only now being considered by archaeologists working on Sicily. One is the occasional lack of correlation between biological definitions of sex and the social determination of the gender of an individual as indicated by archaeological context. On a larger scale we have questions of population dynamics that relate to the colonization process. On Sicily, by the 8th century BCE, the impact of trade and colonization by Greeks as well as by Phoenicians forever changed the native cultures of the island, and vice versa. The biological impact of these immigrant colonizers on the native genetic composition, if any, remains to be studied (cf. Becker 1977, 1982).

Human skeletal analysis may be included as but one aspect of mortuary studies, which can take several different routes in helping us to understand the cultures of the past. One of the more common routes involves the basic study of mortuary practices (Chapman 1987), an example of which can be seen in the work of Pullen (1994). This type of research profits from, and actually depends upon, the osteological analysis of age and sex of the bones recovered (e.g. Bietti Sestieri 1992a, 1992b). Beyond these basic age and sex data lies a broad range of information that can be derived by specialized studies. Robb's (1994a, also 1994b) study of Neolithic populations from southern Italy may serve as just one potential model. Robb's work brings together extensive data on human skeletons from the Neolithic period that had been gathered for more than 100 years. Focus on this single archaeological "period" enabled Robb to extract important new findings (Robb 1997b). Such studies are important not only to general research programmes in human biology, but provide a vital alternative approach to burial studies (see Shepherd 1995).

Where "mortuary" studies have had good databases, cultural differences often can be demonstrated to have existed on a city to city basis. Site specific variation within a small region may be best documented from ancient Etruria where the many necropoleis of several proximal cities have been excavated and shown to be enormously varied in the types of mortuary ritual used, as well as in the tomb type and offerings involved. Beck's (1995) recent collection of papers dealing with mortuary analysis is an excellent example of what can be done by examining social status and ritual, but only 2 of the 11 chapters deal with actual basic studies of the skeletal remains. Shepherd's (1995) recent work has more specific concern for Sicilian examples. These mortuary studies, as so much of the synthetic archaeological work (see Guidi and Piperno 1993) would be enormously strengthened through the incorporation of good skeletal studies within the analytical procedures used by their authors.

The "mortuary" approach in archaeology can be quite different from the use of skeletal data itself. Human bones can be used to study the types and varieties of ancient pathologies that were afflicting a given population, and thereby serve as a basis for determining the origins and spread of specific diseases. Klepinger (1992)

reviews new approaches to this research area as well as to the study of ancient subsistence strategies. Attempts then may be made to define populations using their differential health and disease rates as indicated by these pathologies. In adddition to these focused analyses we should consider the more general approach that involves the study and analysis of the skeletal remains themselves. Intermediate study involves the evaluation of age and sex, and the state of preservation of the individual skeletons. These data are fundamental sets of information for the archaeological record, and essential to the interpretation of cemetery and tomb use, and to understanding other contexts from which bones may derive. Where sufficiently large populations are recovered, these data may be used to depict the biological units that may have correlated with macro-cultural borders. Once again the call for improved recovery and curation cannot be repeated too often, as the analyses described here require optimal preservation and suitable recovery of the skeletal remains themselves.

The following summary is directed toward the consideration of the existing data on all aspects of human biology from Sicily. Primary in this list are evaluations of archaeological skeletal remains, and a consideration of what can be done once a good database has been generated. In addition, included in this survey are all known studies involving any aspect of human biology relating to the peoples of Sicily. These include studies of blood groups, modern mortality patterns, and any other studies that fall into the general category of biological anthropology.

Earlier surveys of skeletal reports from Italy (Facchini et al. 1982-83, Facchini et al. 1988) included studies of human remains from both Sicily and southern Italy. Both of these surveys were far from complete. However, the first of these efforts included data that focused on craniometric data alone, as derived from 19 necropoleis of which 10 were from Sicily. Two versions of a skeletal survey examining only the relevant literature pertaining to Sicily (Becker 1995a, 2000a) were similarly far from complete (see also Di Salvo and Germanà 1997). The present study is intended to provide a complete overview of skeletal and related studies on Sicily from their very beginnings to the first years of the 21st century.

The review of the literature relating to the human biology of Sicily that is undertaken here demonstrates the extent of the rapidly growing sets of useful skeletal data now available for this zone. These data indicate the rich variety of directions that can be taken to understand the biological history of the island and how this information can complement this archaeological record of the past. Note should be made, however, of Robb's (1997a) important observation that as yet the "published data do not allow meaningful comparisons among periods and regions." This evaluation remains accurate to this date, describing a situation that is not unique to peninsular Italy or to Sicily. The extent of the skeletal database now available from Sicily does not appear to be significantly different from that available from most archaeological contexts from the rest of the world. Robb (1997a) summarizes this problem, noting that existing "skeletal reports" rarely indicate so much as the total number of individuals studied and that they rarely specify the exact extent and condition of the bone that had been recovered. Such basic inventories of the skeletal remains found at a site are essential to archaeological studies. Despite the limitations of most of the available studies of human skeletal remains on Sicily a complete listing of the individual reports that are available has some value. At this time scholars such as Robb, who have a research focus that is clearly directed in time and space, provide us with directions for future research. But all progress in these directions depend upon improvements in the recovery techniques of the skeletal remains, a problem that continues to characterize archaeology in Sicily even as we embark on research in this new millenium.

A history of physical anthropology on Sicily

The Classical tradition, as exemplified by Homeric legends, traces human ancestry back to races of giants. In antiquity the "existence" of these ancestral beings was

confirmed by frequent finds of bones believed to be of these giants (Vico 1999: 139-142). These finds now are recognized as the skeletal remains of all types of megafauna that had lived long before the evolution of *Homo sapiens* (see Burgio 1997). The romantic view, that ancestral races of "giants" spread over the surface of the earth due to dispersal by great floods, survived into the 19th century throughout Europe. "Great skulls and bones of an enormous size," considered to be remains of ancient if not ancestral races, provided the weak foundation for evolutionary ideas in much of Europe. These views gradually were replaced by modern evidence for human evolution, beginning in the 1600s. In the late 17th and early eighteenth centuries scholars who were the predessessors of Darwin were as active in the Kingdom of the Two Sicilies as anywhere else in Europe.

In many respects Sicilian and peninsular scholars were more open to evolutionary ideas than many of their contemporaries in northern Europe. The study of human skeletal development by Sicilian scholars is linked with the impressive history of medical research that has been conducted by members of this cosmopolitan community. During the Renaissance many vital studies relating to early modern medicine were conducted in Palermo, many of which derived from the Islamic scholarly tradition that sustained ancient Greek and Roman medical knowledge.

Technological developments formed a parallel line of development that became an important part of the history of physical anthropology on Sicily. During the 18th century the ancient skills employed in the production of wax votive figures, a significant aspect of the use of the ceroplastic arts, were expanded to include the production of anatomical models for medical studies. These models were important instructional aids used in the training of physicians and surgeons. One of the greatest artists in this rare field was Gaetano Giulio Zumbo (also Zummo), born in Siracusa (1656-1701). Zumbo became a master of these ceroplastic arts, creating compositions that brought him considerable fame. Zumbo also created anatomical models that set the standard for the industry (Düring et al. 1999). Zumbo's skills were such that he was lured to Bologna where the demand for his anatomical models reflected the importance of this city as a center for medical studies. Zumbo's workshop had also generated a significant export business. At some point he was in the service of Prince Ferdinando de'Medici, but subsequently took up a post in France (Rossi 1937: 1057). Quite probably Zumbo was conducting business in Paris in 1701 when he died at the very young age of 45 years.

After Zumbo's death, Giuseppe Galletti took over the production of these wax figures in the famous "ceroplastic" workshop. Moulds were produced to meet the considerable demand for these models. By the 1770s Zumbo's studio had produced the 26 different full-length wax models plus over 1500 other wax studies of bodies and organs that to this day remain in the collections of the Istituto d'Anatomia Normale in Bologna. Today surviving examples of this art can be found in collections in at least eight major cities. For example, the impressive collection commissioned for the Military School of Medicine in Vienna, originally shipped by mule from Bologna, is represented by ca. 1,200 surviving items from what may have been a complete set of these anatomical specimens (Düring et al. 1999). Some fine examples of Zumbo's work are also at the Museo di Storia Naturale in Firenze. By the 1850s the production of wax anatomical models had shifted to German where the father and son team of Adolf and Friedrich Ziegler specialized in models of embryos (Hopwood 2002, also Uglow 2002).

Replicas of objects of all types, including items for Madame Trussaud's exhibitions, were fashioned from waxes of diverse qualities and hardnesses. These remained in great demand throughout the pre-plastic era. Religious uses form one category of these objects and are among the best documented. A vast range of items, in addition to simple votive objects and displays, were produced in relatively inexpensive wax. Among the many gifts sent in 1832 by Pope Gregory to an Indian religious community in Canada, as part of a return gift for a object they had sent to Rome, was a wax image of the sacred lamb (*agnello divino*; Becker 2001b: 401). But by 1832 the wax

anatomical model industry was being phased out by increasing availability of cheaper alternatives, including mass produced metal objects and inexpensive multi-color printing processes. Zumbo's studio ceased production at some time during the mid-1800s, almost at the same time that the study of ancient skeletons had become of interest to scholars. Modern medicine, including the study of hard tissue, and the study of ancient bones thus developed in parallel courses in Sicily as in other centers of learning.

Also related to the history of medical research and to later anthropological studies is another aspect of Zumbo's career. Cardinal Prospero Lambertini, who became Pope Benedetto XIV in 1740, had provided Zumbo with important support for the work needed to produce these models, each of which required vast numbers of corpses for disection and study. Over 200 intact human corpses or parts of bodies were needed for the production of a single wax model (Düring et al. 1999: 13). The backing of the Church in this medical "research" reflected a high level of popular and ecclesiastical concern for the support of scientific endeavors. This support continued to enable bodies to be used for research and for the related fields of anatomy and medicine.

Scholarship by members of the religious community in Sicily flourished in the 18th and early 19th centuries. While in Palermo, Father Giusseppe Piazzi, originally from northern Italy, observed and recorded the first sighting of an asteroid, to be names Seres. Although the term "asteroid" was subsequently coined by Herschel, Piazzi's important discovery reflects the quality of scientific research then common in Sicily. Long before the unification of Italy members of the Sicilian scientific community were among the international European scholars who disseminated ideas and findings with amazing speed. Among these academic developments were new ideas in archaeology and physical anthropology that were as well known to Sicilian scholars as to their colleague in London and Paris.

By 1819 Christian Jürgensen Thomsen (1788-1865) had worked out a system of cultural evolution in Scandinavia based on tool types. Thomsen's ideas were not published until 1836, but by the 1840s Thomsen's three chronological stages of prehistory (the stone, bronze and iron ages), based on materials used, had come into common use throughout Europe (Trigger 1989: 73-75). This three-part system, later expanded into five periods, was not the first to incorporate ideas regarding cultural change. Various "ages" of "man" had long been postulated, but usually suggesting a decline from a mythological past in the form of "golden" age, followed by silver and then iron ages. The archaeological evidence helped to shift the mythological approach into scientific fact. The years immediately after 1840 were marked by major advances in the early phases of archaeological research throughout Europe, culminating ca. 1865 when John Lubbock coined the terms Paleolithic and Neolithic to distinguish between tool types and the economies of which they were reflections.

In a parallel development noted by Morse (1999: 1), there were efforts made in the 1840s "to establish a sequence of races for Britain's past based on cranial types." In Sicily during the middle of the 19th century the biological history of the island's population was then linked with the cultural history in more subtle ways. For example, Welcker (1830: 246) discusses various "classes" of men from a social rather than a biological perspective. In general, even at this early date the sophistication of anthropological research on Sicily appears to have been in the forefront of scholarship as compared with the rest of Europe. As early as the 1850s, well before the Italian unification in 1861, modern as well as ancient Sicilian populations were being studied by early physical anthropologists despite their wide distribution throughout the region that became the modern Italian state. Nicolucci's (1857/58) work on human races was part of this new direction in scholarship (see Appendix I). Fedele (1988a: 38-41) offers a brief review of Italian anthropological work during the 1800s, but focuses on the peninsula in recognition of the significant differences then dividing the continent from Sicily. Some specific notes on the scholarly situation in Sicily, found to parallel Fedele's discoveries, are presented here.

By 1864 Lagneau had published his *Instructions sur l'anthropologie de la Sicile.* Lagneau's volume, with its consideration of the ancient "races" of Europe, reflected the extent to which interest on Sicily was part of the vanguard of the world's academic activity relating to human biology. In 1865 a scholar-physician named Giustiniano Nicolucci republished, in a brief pamphlet, his article describing a Phoenician skull found in Sicily (see Appendix I). Nicolucci's statement included the implication that "racial" identities could be established from characteristics that were present in the skull alone. Nicolucci had previously published several works on human anatomy and biology, but developed considerable interest in matters relating to human biology since he also published an article on a Phoenician skull recovered at Tharros on Sardinia (Nicolucci 1869). Of interest is the fact that Nicolucci's many skeletal reports often refer to but one skull, and the maximum number of examples reported from any single excavation commonly is fewer than ten. These limited data sets reflect 19th century beliefs regarding racial uniformity; beliefs suggesting that one example of a skull would serve to describe the population since all the skulls of a single "race" were considered to have looked alike. Alternately, conditions of preservation and recovery at these sites may have limited the skeletal examples to very few.

I suggest that the idea that any example from a sample of skulls would be representative was a more probable factor governing the decision to feature but one skull in these studies. F. De Angelis (pers. comm.) points out that Nicolucci's practice parallels that of archaeologists who publish only a representative sample of materials rather than the entire assemblage. Despite these limitations in their data sets, early scholars such as Nicolucci maintained incredibly sophisticated contacts with colleagues throughout the western world (Fedele 1988b). Nicolucci's contacts throughout the western world are amply documented in the references that he included in his various publications as well as in his surviving letters (see Appendix I).

In 1869, at almost the same time that these important publications of Lagneau and of Nicolucci appeared, the first chair in Physical Anthropology at an Italian university was established at Florence (see Borgonini Tarli 1985). The physician Paolo Mantegazza was appointed to this position in 1870 (Fedele 1988a: 50). Mantegazza was the epitome of the integrative scholar who now, in the United States of America, would be called a "four fields" anthropologist. Not only was he interested in cultural as well as physical anthropology, but he recognized their relationships with archaeology and linguistics. He also extended his research ties to geology, zoology, and to a host of other disciplines (Morris et al. 1988: 312). The establishment of this first post in anthropology was followed, in 1870, by the founding of the Società Italiana di Antropologia ed Etnologia, also in Firenze, followed in 1871, by the initiation of the important anthropological journal *Archivio per l'Antropologia e la Etnologia.* Note that this journal began with Mantegazza's realization that ethnology and physical anthropology were closely related, a view that only much later came to dominate anthropological thought in the United States.

Despite, or perhaps because of the political turmoil involved in the collapse of the Kingdom of the Two Sicilies (Regno delle due Sicilie), the teaching of anthropology was initiated at the University of Naples in 1866. Edoardo Fusco offered courses in anthropology and education from 1866 to 1873, but a chair in anthropology was not established until 1880 (Baldi 1988c: 195). G. Nicolucci was appointed to this chair, only the second in Italy, in 1884 (Fedele 1988a: 37, 54). The lack of a chair in anthropology at Palermo may reflect the 19th century ascendancy of Naples as the dominant city in the *Regno delle due Sicilie.* There was an increasing marginalization of Sicily after the *Rinascimento* as political power, and academic activities, decreased in Naples and became increasingly concentrated in Firenze and Roma.

Despite the political climate in the new nation and the relocation of government support for academies in the south, Sicilian scholars maintained their impressive tradition of research. Around 1870 Giuseppe Pitré, a Sicilian scholar trained in medicine, founded the *Museo Etnografico Siciliano* at Palermo. Between 1871 and 1913 Pitré published 25 volumes of the impressive *Biblioteca delle tradizioni popolari*

siciliane. Particular note should be made that by 1855, before the publication of Darwin's *On the Origin of Species by Means of Natural Selection*, craniometric studies of modern Sicilian populations had been in the process of development (Moschen 1893). Throughout the new Italy the carefully assembled evidence for biological evolution presented by Darwin was accepted by the public as well as the scholarly community, and was rapidly confirmed as the official policy of the Catholic Church (Mazhar 1995). The debate within 19th century Italy centered not on evolution as opposed to divine creation, but whether the multiple human races came from a single origin or evolved in parallel from at least three earlier and separate primate species (Mazhar 1995: 41). Italian scholars and public alike generally accepted a common origin approach, such as remains popular today, while German scholars of that period believed that the "three" modern human races had evolved from three separate primate species. The relationship of that Germanic view of human origins had a considerable impact, or legacy, on social theory in the 20th century. Throughout 19th century Italy the idea of the common origin of all modern *Homo sapiens* kept the scholarly community in pace with developments throughout the Western world.

During the intellectually important years around 1870 a collection of ancient skulls from Sicily had been collected for the Reale Museo Anatomica di Modena (Morselli 1872). Morselli's (1873) study of this group of skulls in Modena, focusing on cranial length and width for the calculation of the cranic index, marks one of the earliest systematic efforts to provide skeletal data specifically from the island of Sicily. About 1872 Carlo Maggioranni published the now extremely rare *Reminiscenze antropologiche della Sicilia* (see review by Mantegazza 1872). During the 1870s other skulls from Sicily also were being sent to Firenze to form a collection that included skulls from various other parts of the newly united Italian republic. The collection of skulls in Firenze unfortunately lacks data on both the cultural and chronological contexts from which they came. Nevertheless, this group of skulls is still used in 'studies' relating to dental wear and methods of evaluating age from the skull. For example, Scarsini and Siani (1994) note that they used a sample of 282 crania in this collection at Firenze and that their sample derives primarily, but not exclusively, of examples from Tuscany, Lombardy and Sicily. Note may be made that no skulls from Sicily were known to have reached the collections of the museum affiliated with the Istituto di Antropologia dell'Università di Napoli (see D'Amore et al. 1981). However, I suspect that the collection in Napoli probably includes examples from Sicily, but that these remain to be identified (see Morris 1988). Any studies that involved the skulls from the collection in Naples should, therefore, be reviewed among the studies included here if examples from Sicily are indicated as being part of this sample.

Early in the 1870s some of the earliest meetings of the International Congress of Anthropology were held in Italy, bringing about extremely rapid dissemination of available information throughout the newly united Kingdom of Italy. In general anthropological research throughout the Italian peninsula developed by maintaining a close relationship bewteen physical and cultural aspects as well as with *paletnologia*, as archaeology was more correctly identified (Tentori 1988, also Puccini 1988).

The period of the 1870s was marked by excavations conducted within several caves along the north coast of Sicily (Zuckerkandl 1877; Andrian-Werberg 1877, 1878; also see Nicolucci n.d.). The bones as well as the artifacts that were recovered from these and related cave sites are treated in a very modern fashion, with concerns about taphonomy (post-mortem processes) providing an entirely new approach to these often complex situations (see Gifford 1981, Rigaud 1989, Solomon et al. 1990; also Becker 1992). Nevertheless, the materials recovered from these early cave excavations provide important sets of data for contemporary comparative studies.

In addition to questions of human evolution and the archaeological record of Sicily, a number of 19th century scholars were continuing studies of modern populations. These biological studies had numerous parallels with the skeletal studies in that they often used techniques held in common with prehistorians. Methods of

craniology as well as of phrenology were employed in these studies of the heads of living people. Broca's important studies of the biology of modern populations (e.g. 1875) plus Lombroso's (1876) incorporation of cephalometric data into his ideas about criminality had far reaching and long lasting influence. Largely suppressed from modern studies of Lombroso's "contributions" to research on human biology as supposedly related to criminal behavior, itself a form of 19th century racism, are his deeply racist publications (e.g. Lombroso 1871; but see Baldi 1988b: 163, cf. Villa 2000: 413). Villa (2000: 420) stands alone in pointing out that Lombroso's daughter was a far greater and more strident racist.

Mondio's study of 180 sane and 20 delinquent individuals from the area of Messina, through post-mortem "observation", claimed to be able to recognize craniometric correlates of the behaviour of those noted as deviant (Mondio 1897: 270). In addition to the data on the ages of these people, the 20 skulls of criminals arrived in Mondio's offices with information regarding their misdeeds, including murder, alcoholism, and vagrancy. The tables listing the skeletal data in no way identify any characteristics that could be correlated with these delinquent deeds. Yet the expectation that criminal elements of human behavior could be identified in physical aspects of the skull continued as part of "scholarly" discourse. Ideas regarding race as well as criminality continued to stimulate studies of human skulls. From this background emerged equally untested "scientific" ideas about biology and race that came to have lethal results in Fascist Germany and Italy as well as in the regions that fell under their control.

These early "scholarly" attempts to identify criminality as well as race from the configuration of the skull generated wide public enthusiasm as well as unwarranted acceptance. These specious studies were matched by popular interest in human origins. Thus the possibility that Sicilian archaeological sites would yield examples of these early *Homo sapiens* stimulated a great deal of activity. By 1877 the archaeology sections of local newspapers in Catania were carrying notices of finds of ancient skeletons. These papers also provided popular commentary on current scholarly research by Luigi Pigorini (see Pigorini 1877) and others. The archaeological reports of that period generally make reference to human skeletal material being found, an important feature of research at that time that later was to fade. Thus Cafici (1878) offers at least a brief description of the skulls (e.g. "*al tipo brachicefalico*") and of the teeth that were seen in the course of his excavation at the *comunello di Giarratana* in the Monterosso area of Siracusa. Whether any of these bones or teeth actually were recovered and curated remains unclear, but Cafici's interest reflects a pattern of attention that continued throughout the last decades of the 19th century.

By 1882 Bertè was giving public lectures on human origins and how skeletal evidence from Sicily were related to contemporary theories. His principal lectures were published the following year (Bertè 1883). The availability of the published volume of Bertè's work was noted by his colleagues in Rome (Pigorini 1883: 108; Anon. 1883). Bertè also had, by 1882, begun to collect skeletal materials for "*un gabinetto di antropologia siciliana*" as is clearly indicated in the scholarly literature (Anon. 1882: 232). From these notes, probably written by the editors of these several publications, we know that Bertè "*ha iniziato nella Università di Catania una collezione antropologica siciliana...*", but we do not know exactly what was in this collection, nor do we know what has become of this important group of human skeletal materials.

Another contemporary note (Anonymus 1885:60) states that three crania from the Caverna della Matta in Liguria as well as others from various (peninsular?) locations had become part of the Catania skeletal collection. What is not indicated is exactly how many skulls from Sicily were included among those that were gathered in Catania. This same series of skulls also may have been used to derive the facial measurements of Sicilians published about the same time (Anonymus 1885b: Table X; see also Livi 1886: 260, 294, 300-301), but the specific details needed to confirm this inference are not presented in this anonymous paper. Excavation notices that appeared during

these decades of the late 1800s continued to make specific reference to the recovery of human bones, such as the examples from Failla (1 km. from Isnello; Anonymus 1891: 188-189). The excavation of a Neolithic period tomb near Ragusa Inferiore (Siracusa) recovered a great deal of human bone and at least one articulated skeleton (Anon. 1891: 189), perhaps from a Copper Age chamber tomb. Whether or not any of these bones were actually placed into storage remains uncertain, and none can now be identified among known skeletal collections.

The various early reports relating to the activities of physical anthropologists appearing in the *Bullettino di Paletnologia Italiana* also note the excavations of Giuseppe Sergi during the 1880s and early 1890s. Orsi had defined four cultural stages or periods to which he assigned Roman numerals I through IV. Considerable confusion then was common in assigning sites within this sequence leading to a great deal of later confusion. Thus Sergi, who was working at various sites such as the Early Bronze Age Castelluccio which he identified as "Iron" age, recovered several skulls, without their post-cranial skeletons. The recovery is clearly recorded, but the dating remained problematical for some time (see below). During this period Paolo Orsi (1891a: 76, 1891b) also was providing data regarding human bones found in his excavations, including his estimates of how many individuals he believed to be associated with each of the collective tombs that he found. Orsi's biography (1859-1935) and importance in the prehistory of Sicily, with over 300 related publications, is well covered by Leighton (1986b). Orsi (1892:27) indicates that as many as 19 people were found in one Sikel tomb at Castelluccio. While these statements, like many others also published in *Notizie degli Scavi di Antichità*, are probably far from accurate assessments, they do reflect a concern which not all archaeologists shared, and one which soon was to be dropped by most archaeologists.

Giuseppe Sergi (1841-1936) was particularly effective in disseminating information that related his Italian skeletal data base to other human skeletal studies throughout the Mediterranean (Sergi 1892, 1908; cf. Zampa 1891, also Moschen 1893). Sergi appears to have been excavating various sites in order to recover human skeletal material. Some 100 years later the somewhat parallel study by Rickards, Biondi and De Stefano (1990), using genetic data from human bones, have been no more helpful in our understanding of racial or other groupings. Sergi's basic work on the Mediterannean "race" (1895c) achieved enormous popular success, appearing in three English editions between 1901 and 1914. Of particular note is Sergi's sophisticated use of the term "race" in a modern biological sense as a sub-specific population rather than as a term that linked biology and culture. Sergi's deep racism (Sergi 1889b) is discussed within the context of his times by Villa (2000: 413). The impact of Sergi's fundamentally racist concepts on his study of the Mediterranean "race" (Sergi 1895c), and how these ideas appear in the English translation of this work merit further study.

In general, most of the scholars involved in the early studies of "race" equated the behavior of a specific biological group, or their culture, with supposed biological characteristics that these scholars assumed could be identified in the skeletons (cf. Blanckaert 1988). These ideas regarding the essential linkage between race and culture are fundamental to racist ideology (see Burgio 2000), and are antithetical to most modern anthropological theory. This usage of the term "race" to indicate a specific population, or "culture," is still common among non-academic Italians as well as many other non-academic people throughout Europe. For example, the inhabitants of a specific town or village are commonly said to belong to their own "race." The size of these "racial groupings" increases with distance from the speaker's city of residence. Thus an Italian villager may speak of the "American" race as if it could be equated with behavior, and presumably the biology, of the "race" of people living in the next village.

The early activities of several Italian scholars concerned with collecting anthropological material can be linked with their long history of lecturing and publishing in Catania and Messina (e.g. Sergi 1889). Of specific significance in the

history of skeletal studies on Sicily is Sergi's "Crani preistorici della Sicilia" (1899, 1900a). This work remains significant as an indication of the specific skeletal populations that had been collected and were available for study at the beginning of the 20th century. Yet perhaps the most important of Sergi's contributions was to be in the form of his work in establishing the discipline of physical anthropology within the university system.

During the late 19th century the course of developments in Italian anthropological studies is reflected in the importance of individual scholars to specific regions of the country. Thus Nicolucci is firmly associated with research in the area of Naples (Fedele 1985). Giuseppe Sergi, however, had a wider influence and was but one of several scholars of significance to those studies that then were coming out of Sicily. The combined anthropological efforts of Sergi, Orsi and others were the subject of a lecture delivered in 1893 (Salvo di Pietraganzili 1893; also Anon. 1894: 141). In 1893 Sergi founded the Società Romana di Antropologia, and served as its first president. His considerable efforts in the field of human biology continue to be recognized, with his name also being part of the present Istituto di Antropologia "G. Sergi" at the Università degli Studi "La Sapienza" di Roma. The formal teaching of physical anthropology at Messina did not begin until 1946 (Capecchi 1985), but this city was important in the history of this description. Courses in physical anthropology were not instituted at the University of Palermo until 1954 (Correnti 1985). A chair in physical anthropology has only been established at Palermo since 1995, with the search for a permanent professor now continuing.

By 1895 the possibility of recognizing culturally distinct native populations, such as the Sicels (see Sergi 1891) or Elymians, had become one of the primary interests of physical anthropologists working on Sicily (also Sergi 1895b). In effect, these scholars continued to search for distinct "races" that they believed could be identified clearly and unequivocably by their skeletal biology (cf. Chiarelli 1986). The focus of these studies, as those before them, continued to be on simple craniometric ratios, as computed using the simple ratio of the metric data from skull width divided by length.

The use of the skeletal record from an archaeological site to provide paleodemographic data has a history extending back to the first decades of the 20th century. In Italy and other parts of the Mediterranean these methods first were applied after 1945, with Sicilian archaeologists keeping pace with colleagues throughout the region, or those comprising what De Angelis (1996: 102) terms "the classical archaeological community." De Angelis (1996: 101-102) provides a brilliant summary of the situation, noting the important observations of Pelagatti and Vallet (1980) and later commentary by Vallet (1988) regarding the general lack of interest in utilizing the human skeletal record in archaeological interpretations. The extent of this lack of interest noted by these scholars has changed very little, with the notable exception of several scholars who have made very important contributions to the recovery of human skeletons for analysis. Ian Morris's 1992 note regarding the situation, quoted by De Angelis (1996: 102) remains largely true to this day.

Classical archaeology generally lags behind prehistory in skeletal analysis. Even today it is not unknown for hundreds of skeletons to vanish after excavations, while associated vases are published in meticulous detail. Many fieldworkers seem unaware of the importance of this material for historians (Morris 1992: 101).

Despite the long history of the collection and measurement of skulls from ancient sites on Sicily, with studies generally in parallel with those made on the Italian peninsula and elsewhere in Europe, recent developments elsewhere in the world have not been matched by similar gains. During the last half of the 20th century many archaeologists working on Sicily had come to ignore human skeletal material during their excavations regardless of the condition of these bones. Some exceptions were made when intact crania were found, but by 1950 a general disregard for human remains from tomb contexts had become common throughout much of Italy as well as the Mediterranean in general. The paucity of research on human skeletons during those decades marked

an interesting shift from the intensity and optimism that had characterized the last decades of the previous century. Why this came to be can be explained by several factors.

Craniometrics and clines

Early physical anthropologists had recognized that the form of the skulls of different populations, when seen from above, often differed considerably. This observation led these scholars to attempt to characterize populations on the basis of cranial shapes (Ripley 1897). These ideas had been employed in the search to identify "new" migrations of distinct "races" (read "cultures") to island areas such as Sicily (Gerhardt 1876). Sergi's (1901) study of Etruscan skulls, following Nicolucci's earlier enquiries regarding Phoenician skulls, was a parallel attempt to define a "pure" race using craniometric data (see also Sergi 1900b; Boëtsch and Ferrié 1994).

The traditionalist approach of these 19th century scholars can be found in some recent works. Germanà (1978) has some data that he uses as a confirmation of Gerhardt's century old ideas with data from Sardinia. More recently Germanà (1994) has applied the same techniques to Sicilian prehistory (see also Leighton 1999: 111-112). Germanà and others continue to share the belief that populations can be identified solely by data on the length-to-width ratios of their skulls. People with "long heads," or a length much greater than width, are identified as dolichocephalic while brachycephalic peoples had "short heads," or an average length not much different from breadth. In the past these basic extremes were then combined with other observations in complex, but solely descriptive terminologies, to identify "races" (cf. Livi 1886; also Passarello 1974).

The theory that there exist "pure races," or biological populations within which all members can be distinguished from all members of "other races" has long been superseded. Nevertheless, cranial form as diagnostic of 'populations' was still held to be useful, by a few researchers, throughout much of the 20th century. Recent variations on Livi's traditional view suggest that hybridization can be identified by head shapes, as determined through the traditional length-width ratios (e.g. Di Salvo and Germanà 1997, following Hug 1940). Hug and his followers use Schmidt's (1900) ideas, presented in an unreferenced "survey" of head shapes as described by cranial index. Schmidt concluded that Sicily could be characterized mostly by peoples with the cranial index (CI) in the range of 78 to 81, with some groups along the northern coast listed with CIs of 77 or lower. The early data gathering process shared by physical anthropologists focused on skulls and skull shapes. While generating vast lists of numbers, these approaches lacked methods for interpreting those data in meaningful ways.

To some extent the difficulties of these early approaches to anthropological analysis involve a reliance on describing skulls, or three-dimensional objects, using two-dimensional attributes such as length and width. The human skull, which continues to provide the vast majority of the measurements used to describe an individual as a member of a population, cannot be characterized through the use of lists of two-dimensional traits. That approach to population studies had been largely superseded in Sicily by early in the 20th century, although it continued to be applied in Egypt (Morant 1925), and elsewhere in the Mediterranean for many decades. Rare appearances of these ideas continue to appear in the secondary, and generally unrefereed literature.

Another common belief held by many scholars, and often shared by Classical Archaeologists and early physical anthropologists, was that culture change commonly resulted from invasion and/or migration of populations. This widespread belief that invaders supposedly brought with them different skull shapes, supplanting those cranial configurations of the native peoples (see Hole 1973), had many manifestations in the early days of Sicilian archaeology. Shepherd addresses the question of these traditional ideas in her important study of Greek colonization of eastern Sicily. Shepherd (1999: 277) points out that the "of repeated view that the newly arrived

Greeks expelled the Sikels by force from Ortygia, based on Thucydides (4.3)" was supposedly confirmed by early interpretations of data from Orsi's (1918) excavations. Shepherd points to recent finds of evidence contradicting this "invasion-displacement" view (in Wilson 1982: 87, 1988: 111), but she does not discuss the general intellectual shift away from the "invasion-displacement" concepts that commonly had characterized past archaeological interpretations of culture change throughout the world. We have progressed from the ideas of Bosch Gimpera (1925) regarding "migrations" to explain apparent cultural similarities during this period, and the correlated idea of biological spread (see Marazzi et al. 1986).

Scholars working with the complex problems of cultural contacts and colonization on Sicily have expanded the field of interest to include geater consideration of the role played by native cultures on the island. The considerable discussion now available regarding the various native peoples of Sicily (cf. Braccesi 1992) and their active role in these processes of change, is notable. As yet no specific effort has been made to distinguish among the ancient peoples identified as Siculi, Sicani or Elimi, or among any of the colonizing or later conquering populations, solely on the basis of biological characteristics (see Becker 1982).

All of the problems involved in these early studies of the cranial index (CI) have been recognized and discussed in a brilliant paper by H. Grimm (1982). Grimm also recognizes that the value of the many early collections of skulls was limited by the lack of associated dates (temporal controls) and often even geographic information relating to these skeletal "artifacts." Grimm also points out Boas's (1910) important research demonstrating changes in body form and CI among the descendants of immigrants in America. At the beginning of the 20th century several physical anthropologists had noted that the shapes of the heads of offspring of immigrants into America differed considerably from those of their parents (Boas 1910). This important discovery often has been questioned over the years. The most recent suggestion that Boas may have shaded his data (Sparks and Jantz 2002) led Gravlee, Bernard and Leonard to initiate the most thorough review of those early findings. Gravlee et al. (2003) conclude that Boas was essentially correct in his conclusions. The line of research initiated by Boas has profound implications for craniometric studies in general, and for those involving migrant populations in particular.

At about the same time that Boas was publishing his data, note was made by other scholars of changes in head shapes through time within the same biological population. Speculations regarding reasons for these changes abound, but as yet no answers to questions regarding these "autonomous" (my term) changes have been found. These findings regarding changes in skull shapes in modern populations are of particular concern in the study of Longobardic migrations into Italy, and the recent brachycephalization of northern Italian populations. Even more important is the significance of Boas's findings for possible changes in various Sicilian populations associated with colonists from both Greece and also from the Near East. The possibility that the cranial configurations of these immigrant people and their descendants when in Sicily may differ indicates why modern DNA studies are even more important in addressing these questions.

The past problems involved with theories reliant on studies of the CI found parallels in the work involving the recent examination of a small sample of the then living five million Sicilians to evaluate the distribution of ABO and 12 other blood markers. The goal was to determine possible variations within the island and to compare them with other populations around the Mediterranean. The results of this project revealed an affinity, as expected, between Sicily and southern Italy and a much lesser relationship with Greece. The study strongly differentiated Sicilians from North Africans (Vona et al. 1998; cf. Beretta et al. 1986). These results have interesting parallels with studies employing various techniques of DNA analysis, summarized below. Vona and his colleagues also provide a bibliography of similar "blood" surveys made in all of Italy. These surveys of blood types in modern populations reflect gradual

biological differences, or clines (see below) that can be recognized as we move through space, as would be expected by contemporary biological theory relating to animal populations. Humans, unfortunately, had long been thought to be exempt from these rules. However, no evidence has ever been presented to confirm these supposed differences in human populations, except by those limited studies of Europen migrations into the New World and Australia. The extent and reasons for these biological changes supposedly wrought by factors relating to migration have never been studied.

Note also may be made that these early anthropologists rarely attempted to incorporate similar linguistic studies into these searches for pure races. Linguistics, which had been taught at least as early as 1614 at Italian universities (Testa Bappenheim 1985) still had its own specific set of limitations in the 19th century. Many departments of anthropology within American universities emphasize a "four fields" integrated approach. In this model linguistic studies are considered related, in some fashion, to skeletal studies. The European tradition generally considers the American "sub-fields" of anthropology as separate areas of study, and without concern with their integration. Nevertheless, we should note that the ancient Etruscans had long been believed by scholars of the Classical World to be a population that recently had "immigrated" into central Italy from the east, a theory highly suited to testing by both skeletal (biological) as well as linguistic evidence. Today the *in situ* theory of Etruscan cultural and biological evolution is generally accepted, but the old idea of migration was one that had dominated thought until the 1970s. The Sicilian parallels involved the belief that the Sikels and other cultures of Sicily during the Late Iron Age also were recent immigrants' to the island. The autochthonous view that dominates recent scholarship, considering these peoples to be indigenous to Sicily, has its basis in archaeology rather than fanciful interpretations of the folk traditions that seem to be the basis for the ancient texts.

Contemporary population models include the concept of "clines" or graduated variations in individual traits that can be identified within animal groups that are widely distributed through space (Huxley 1938: 219-220). The concept of clines, as in "incline" or "decline," as applied to human populations is a basic taxonomic principal, and may be defined as follows:

Cline: A gradual progression in the dimensions, form or color of an anatomical feature from one geographic region to another (from Coon 1963: 18, 713).

Clines also are believed to exist in human populations, with genetic and morphological changes through space reflecting normal biological rules. Clinal variations, however, are best recognized in animal populations only over distances greater than several hundred kilometers. Factors influencing clinal variation also are significantly influenced by geographical features within the study area. Human mobility and other activities involving population movement may reduce our ability to identify clines in human populations and possibly may rule out any possibility of identifying specific features associated with them. In addition, human mortuary practice also can limit the available biological evidence needed to conduct studies, especially where cremation are common (see Buikstra and Swegle 1981) or even where partial cremation was practiced (Gualtieri 1982, Becker 1982). Even the most minimal archaeologically recovered data from human skeletons is essential to determining aspects of possible diversity. Since all populations manifest a wide degree of internal diversity one needs considerable population data to determine the nature of the cline for any feature. In most human situations we simply lack suficient data to reach conclusions regarding populations, but at present there is evidence to suggest that even populations separated by as little as 250 kilometers might be compared successfully. On Sicily the effects of island isolation may facilitate such studies.

The basic biological principals relating to clines provide the theoretical basis from which contemporary biodistance studies are derived (e.g. Ferrell et al. 1981). In fact, the slight statistical variations that do exist between general cranial

configuration in populations for the most part cannot be recognized without the analytical methods that have become available only since the computer revolution (e.g. Jantz 1972, 1974, Bass 1979; Sjøvold 1984; Buikstra et al. 1990). The standardization of measurements specifically designed to provide three dimensional characterization of the human skull (Howells 1973, 1989) enhanced the discriminatory abilities of these researchers.

Utilization of these new standard methods of measurement joined with the ability of computers to process incredible amounts of data have enabled scholars to make meaningful comparisons between populations, even those only minimally distant in time or space. The impressive results of these studies were applied in the Mediterranean region (Musgrave and Evans 1980) quite early, but have not been used extensively since that pioneering effort.

During the period of development of these improved descriptive techniques in bio-anthropology, some reesarchers also began to develop an entirely new approach to comparing populations, or differentiating among them. Berry and Berry (1967) developed a list of non-metric traits that often were associated with the human cranium and might be utilized to characterize a specific population. Whether the individual traits in this series were genetic in origin (see Sjøvold 1984) or were present (or absent) as a function of cultural, ecological, or other factors is irrelevant to our goals (see Hertzog 1968, also Benfer 1970). The goal of non-metric description is to characterize a population for comparative purposes. The origins or sources of the characteristics that occur in any specific population does not matter.

The non-metric series of traits first provided by Berry and Berry, and now supplemented by others (e.d. Pinto-Cisternas et al. 1995), as well as the more traditional metric and morphological descriptions, enable us to describe or compare populations as statistical units. The "meaning" of these descriptions derives divergence or similarities between populations, supposedly reflecting a genetic (but possibly cultural) relationship that can be traced in time and space. The early advances in the identification of human skeletons (Bass 1979) have been built upon, and our ability to describe biological histories of populations is now considerable, but remain dependent on the adequate recovery and curation of the skeletal evidence.

One of the early clues to the limitations of applying migration or invasion theories to the prehistoric period of Sicily, as elsewhere, was the failure to find confirmation of these ideas through early studies of the skeletal evidence. Attempts to identify the "race" of early invaders, and thereby to locate their erstwhile "homelands", produced no meaningful results. If, as once believed, foreigners had supplanted the prehistoric population of a given area then we might expect to find notable differences in the biological characteristics of successive groups occupying a single area (see Becker 1977). Like the identification of "pure races," these postulated differences in skeletal biology of "invading populations" have never been detected (e.g. Becker 1994).

Since there are some very well documented "invasions" of humans as well as other animals and plants, dating from the historic period, these provide useful models for inferring processes of culture change in the past. What we do not have is direct biological evidence for either an historic or prehistoric example on Sicily or anywhere else. What we now are seeing more clearly are the processes of culture change that transpire without the need to infer complete population replacements. In fact, archaeologists are now coming to recognize the importance of cultural studies that demonstrate how effectively people maintain their cultural traditions in the face of significant changes in material culture, particularly those changes that occur when imported goods become highly fashionable. In addition to these insights, modern systems of dating archaeological contexts reveal that some changes in material culture once seen as very rapid may have been the result of normal changes that took hundreds of years (Zeuner 1970). The early and sometimes crude use of 14C dating, developed 50 years ago (Ehrich 1965), has been refined considerably during the past few decades, leading to a better ability to see these changes slowly taking place in archaeological contexts. Innovations in archaeological method and theory have resulted in many of

the refinements that are currently being proposed in the chronologies of Sicilian prehistory. Theories that postulated violent and rapid culture change have long since been replaced by more sophisticated models reflecting slow change through processes of internal evolution.

An early decline in interest in human skeletal studies on Sicily

By 1895 the absolute volume of archaeological and anthropological material being recovered on Sicily, as throughout Italy, had become enormous. Perhaps the early failure of craniometric studies to produce useful information led archaeologists to reduce their commentary on skeletal finds associated with their excavations. Perhaps there simply was not time nor space in their publications to consider human skeletal recovery and analysis as the volumes of archaeological artifacts multiplied. Archaeological reports had, for most of the late 19th century, been constantly expanding in size to accommodate interest in the materials recovered. Despite this trend toward expanding size, by 1900 references to human bones in these Italian archaeological reports had declined sharply. Orsi (1903: 144) offers only the following note regarding the human skeletons seen, but probably not recovered, in the excavations at a Syracusan necropolis: "si trovarano almeno diece dozzine di scheletri frantumati...". This is one of the last direct references to the discovery of human bones to appear in the archaeological records being published in Italian journals and in Italian excavation reports until many years later.

Although Giuffrida-Ruggeri (1907) continued to conduct studies of skeletal remains into the 20th century, and offers modern scholars an excellent bibliography of early reports from Sicily (cf. Sergi 1906, also Sergi 1908: 282-289), the first half of the new century saw a significant decline in the archaeological interest in bones. Even the most preliminary of the early studies of human bones often provide excellent metric data that can be useful in modern studies These early studies became increasingly rare even in the Italian "anthropological" journals. The analyses of the skeletons then being recovered did not simply attempt to recognize the hypothesized factors that might serve as "identifiers" of racial differences. Many of these early studies included listing of metric data that the authors presumed would become of use at some time in the future. Today some of these data have become of interest, particularly since many of the reports survive while the actual no longer can be found.

During Italy's extensive Somalian ventures many physical anthropologists shifted the focus of their work to Africa (see Taylor 1987, 1988). Those who continued to study populations within Italy became increasingly caught up in the political winds of that period. These multiple trends resulted in nearly complete isolation of human skeletal studies from those archaeological activities of a century ago. A concise review of anthropological activities in Italy during the 1930s is provided by Signorelli (1988) who also offers comments on many of the publications of that era (see also Morris 1988: 249, n4).

By 1950 most of the massive necropolis excavation reports from Sicily were treating human bones only as a decorative item in burial photographs. Little or no mention of these "illustrated" bones appears in the accompanying texts that describe these burials (cf. Bonacasa Carra 1996). Unfortunately this trend trend continues to this day. Some more recent reports on cemetery excavation include "decorative" appendices including what pass for skeletal reports, but these have little or no concern for the contexts from which the bones were recovered. Even where these bone reports attempt to relate the skeletal data to the archaeological contexts (e.g. Becker 1996b), some excavators commonly disregard the contributions that can be derived from the anthropological data.

After 1950 Corrain (Università degli Studi – Padua) began to study a few small collections of human skeletal remains that had been collected from Sicilian excavations. The 28 page long bibliography of his 395 works dating back to at least 1953 (Corrain 1992) lists these publications only by author. Subjects, chronology, and regions are not indicated. This organization leaves us to speculate on the relevance of the content

based only on the titles. A few of these many publications can be determined to relate to Sicilian skeletal samples, their pattern is as random in presentation as is the organization of the data that each presents. Also characteristic of these reports and other "studies" conducted by scholars on the continent is the use of problematical age categories in mortuary analysis (e.g. Di Salvo and Germanà 1997; cf. Heizer and Cook 1960). The categories used reflect arbitrary numerican symmetries rather than aspects of human mortality patterns. Thus information that is critical to understanding human dynamics is lost in these approaches that reflect a truly insular approach to studies in physical anthropology. That these traditional but inappropriate approaches to skeletal studies continue to be used at all is not surprising. These evaluative techniques are commonly applied to skeletal collections from excavations where the recovery of human remains is not considered to be an important goal and the data and significance derived from them are not of real interest to the excavator. If the goal is to have a decorative report, then the quality of the data in that report becomes irrelevant.

In recent years the larger and more international excavations on Sicily are recording and recovering human remains on a more regular basis. We also see some "retrospective" studies that generate analyses of bones from past excavations (e.g. Becker 1996b). However, these "retrospective" efforts are often only decorative additions to situations where the original recovery and curation of bones were below the standards now considered to be basic to achieving success (e.g. Becker 1998a).

Present realities

Some of the problems involved in the recovery of human skeletons derive from differential preservation of the bones.

Waldron (1987) has addressed the difficulties involved in the relative survival rates of human skeletons as they influence studies of paleopathology (see also Mancester 1987). However, on Sicily the general lack of interest in the recovery of skeletons as a normal part of archaeological research, and the consequent inability to conduct skeletal studies, has been felt in all areas of osteology. Variables in recovery methods and in subsequent conservation also play an important role in providing material for study. Every bit of bone or tooth is important, as are the contexts from which they derive. The most tiny scraps of human bone and bits of teeth can provide significant information when analyzed by physical anthropologists. Archaeologists need to be aware and concerned with this fundamental aspect of data recovery. An excellent discussion of modern methods of excavation and curation for both cremations and inhumations (McKinley and Roberts 1993) merits wider distribution as well as careful attention by field archaeologists.

Robb (1994b) points out that various skeletal reports relating to archaeological populations reflect recovery techniques in the field, or lack thereof, as well as indicating the selective interests of the people making the skeletal studies. Thus numerous factors in addition to basic problems of skeletal preservation may inhibit the types of regional and temporal studies that are envisioned by some physical anthropologists working on Sicily.

Until quite recently archaeological excavations on Sicily tended to focus on the very traditional process of data gathering rather than being directed by specific theoretical concerns. In no case were the early Sicilian archaeological field records joined with human skeletal analyses in an attempt to "solve" archaeological problems. The paucity of effective relationships between field archaeologists and physical anthropologists skilled in the recovery as well as in the analysis of skeletal material may be a critical factor retarding progress. The resulting reports rarely include information on the human skeletons encountered, or even any indication regarding bone recovery. This lack of skeletal information is not a problem unique to Sicily. A modern search for appropriately large and well-preserved skeletal samples for use in

osteological studies was first proposed for Sicily 20 years ago (Becker 1982). In that same year Reece (1982), addressing matters in a very different region of Europe, noted that the greatest failure of cemetery studies in the northwestern provinces of the Roman empire was the lack of skeletal reports. Reece indicated that this problem was exacerbated by the failure to incorporate the findings from those few reports that were issued with the archaeological record. The problems that Reece pointed out for the area of his expertise not only were also applicable to Sicilian archaeology but were, and continue to be, a world wide problem.

The recovery of skeletal material on Sicily traditionally had been largely random, and problem oriented analyses of these bones were rare. Although more data are available today, co-operative studies between archaeologists and physical anthropologists remain uncommon (but, see Lyons 1996, and the related report by Becker 1996b). Co-ordinated studies of the archaeological contexts and the human skeletal remains recovered from them, particularly from cemetery areas, remain largely theoretical theoughout Italy despite recently enacted legislation that provides funds for the analysis of human bones excavated from government supported field projects. Nevertheless, focused research problems involving bones as part of normal excavation strategies remain infrequent in the literature. As noted above, many excavation reports make no reference to human bones or use human bones principally for their *in situ* photogenic value when graves with tomb goods are illustrated.

The recognition by Pelagatti (1976) and others (e. g., De la Geniere and Nenci 1984) of the importance of human remains in the interpretation of necropolis and other archaeological sites on Sicily marked an important change in modern attitudes on the island. Dr. Pelagatti recognized that increased attention needed to be paid to the study of human bones on Sicily if local archaeologists were to provide modern types of interpretive studies and to achieve precision in their interpretation of the human skeletons in the graves being examined. Her efforts were well received by a few archaeologists, notably G. Falsone (e.g. 1990, see also Guzzone 1985-86). However, the goals of most archaeologists remained the same and rarely extended to the recovery and processing of human skeletons from their excavations (see Stroud 1989). However, Doro Garetto also responded to Pelagatti's call and arranged a series of landmark studies of Sicilian skeletal material. Pelagatti's continuing interest also led, through her direct introduction, to the initiation of my own skeletal studies of those Sicilian skeletal populations recovered by Falsone, Mannino, and others based in Palermo.

Human skeletal reports that remain divorced from the archaeological contexts, from which the bones were found, reflect the lack of shared goals between many contemporary archaeologists and physical anthropologists. Rarely do we find recent osteological reports from Sicily that discuss related cultural factors (but, see Becker 1997a; cf. Neel 1970). Skeletal reports continue to appear as separate publications, isolated from the archaeological data, or appended to an archaeological report in which the osteological data is not integrated into the text.

All of these difficulties in bone recovery are matters that precede the interpretive problems involved in skeletal analyses. Robb's findings for peninsular Italy, and specifically the Neolithic period represented in his skeletal studies, is paralleled by other regional studies of the Neolithic period. A review of human skeletal studies for the Sabine area, as an attempt to characterize these peoples biologically (Becker 1996a), encountered the same lack of skeletal recovery described by Robb. These limitations are far from being unique to Italy. Taking the traditional approach that viewed eastern Mediterranean "socio-cultural region as a single entity," Pullen (1994: 114) concluded from the available Greek evidence that there was wide variation in many aspects of the lives of these peoples during the Early Bronze Age (EBA). However, the osteological data available to Pullen were so poor that he could not derive secure conclusions. Thus Pullen's regional studies of mortuary behavior for EBA Greece, in an attempt to derive some information about social organization, reflects the bone recovery problem that extends throughout the area.

Angel's (1943) work on a small Greek island addressed matters of population biology that render the study of a circumscribed island population such as was found on Sicily of even more interest. While much has been written on the subject of archaeology on islands during the past decades, Angel's work focuses on the population of an extremely small island that may be below the threshold for such studies. This is more obviously the case for Lipari and the other Aeolian Islands off the northeast coast of Sicily where excavations (Bernabò Brea and Cavalier 1956, 1957, 1960) have generated extremely important information. However, no skeletal studies are known for the human remains located during the excavations in the Aeolian Islands. The study of human skeletal studies from all parts of Sicily reflects an extremely large number of variations in the quality and quantity of basic data presented, just as Robb predicted. The collation of allavailable studies as a prelude to future research, or to focused projects, may produce answers to the kinds of questions that have been asked since the beginnings of these skeletal studies.

The study of the human population on Sicily has not yet been able to treat these people as a single unit due to the large size of the island as well as the limitations of the skeletal evidence from early periods that now is available. Recent contributions to research on skeletal biology of various populations on Sicily (e. g. Ganci 1973) now place us in a better position to consider testing these theories concerning the dynamics of island populations and population differences among islands. Studies of the human skeletal remains from Sicilian archaeological sites should enhance our understanding of the culture history of the entire region may be better understood (see Binford 1972, Robb 1994a; also Robb Ms. A).

Analysis using recently developed programmes for computer imaging three-dimensional craniometric models has allowed the development of biodistance studies (Lewis 1997). Quite possibly the "cultural" differences among native peoples of Sicily that were suggested a century ago now may be biologically confirmed or rejected using such techniques. This is but one of the many research methods now available to physical anthropologists. In turn, the discrete biological units representing these native peoples could then be compared with protohistoric and historic immigrant colonists from various parts of Greece, or from Carthage (see Becker 1985). Such comparisons may allow us to see physical differences and to plot the course of biological merging through time. Shepherd's (1999) brilliant evaluation of the pins called 'fibulae' recovered from graves at Siracusa and other Greek colonial sites has allowed her to infer patterns of intermarriage between Greek colonists and the native population. Her findings should be confirmed through a parallel study of the biological evidence from the bones from the same graves from which these categories of pins were recovered.

The detection of biological microevolution, in space and time, remain important to the establishment of populations that can be compared meaningfully. Simple temporal comparisons of data remain a sufficient goal in archaeology by many scholars. Ideally, studies of the rates or speed of biological merging of these colonizing peoples, from the earliest trading ventures (see Bernabò Brea 1957; Fisher 1985) down through the Hellenistic and Roman periods, also could help us to infer patterns of cultural interactions between these various groups. Biological studies also may help us to understand unusual variations in cultural behaviour for which no explanations are evident (see Sherratt 1973). Pelagatti (1976) pointed out that the Casmene people, of the second colony from Siracuse, employed burial methods that differed from those known in any other Sicilian colony (see Dunbabin 1948:101). In fact, ancient mortuary rituals varied considerably from city to city as well as over time. The differences among these various groups may reflect interesting cultural processes that could be better decoded through anthropological study (cf. Shepherd 1995).

Researchers should very much like to be able to provide a biological characterization of indigenous Sikels as they were prior to the impact of extensive trade and colonization from the Greek and Phoenician-Punic worlds. The intermediate location of Sicily between Africa and peninsular Italy renders the biological situation very interesting.

Although we are not yet able to characterize an "African" immigrant population or specific individuals (Jamieson 1995: 46), the clines for any human biological trait should vary sufficiently between Africa, Sicily and the mainland, to permit distinctions to be made with ease. Microvariations within these regions also should be detectable (cf. Jantz 1972).

A more sharply defined shift in the biological composition of a population might be recognized at Mozia, the island just offshore from modern Marsala where the first Phoenician colony had been established (Tusa 1971, 1974). The colonial occupation of this island, and the expansion of the colony from Mozia to an onshore location at Lilybaeum (modern Marsala), supposedly came to an abrupt end in 397 BCE. In that year historians believe that Dionysius, from the Greek settlement of Syracuse on the east end of Sicily, broke through the Punic defenses and "destroyed" the ancient city of Lilybaeum (Tusa 1983). The extent of this destruction remains uncertain since no clear break has yet been demonstrated in the occupation, or in burial patterns within the huge necropolis that extended out from the city. The question that emerges relates to the extent of biological change that may, or may not, have resulted from this significant and rapid shift in political orientation (cf. Becker 1994). No such change has been documented from other Greek colonial contexts, such as at Satricum in Campania (Becker 1994) or at Salento (Yntema 1982). The written records relating to both sites might lead us to suspect that biological change could be evident, but such changes have not been demonstrated.

The following sections of this report review the known sources of information on studies of human skeletons and human biology that relate to the peoples of Sicily, arranged by temporal units as defined primarily by archaeology. This organization is intended to suggest how these studies evolved for each period and to provide some basic information regarding the strengths and limitations of these reports. These data are also intended to serve as a starting point for researchers interested in conducting human skeletal studies in any part of Sicily. The published studies as well as unpublished reports may serve best as a guide to existing collections of human remains, now available for further study. The value of the information in these reports lies principally in the indications they provide regarding the locations of skeletal samples for study for comparative research.

A recent survey of trepanation and related subjects in Italy provides a wide range of information from Sicily (Germanà and Fornaciari 1992), but some very traditional attitudes still appear in the literature (e. g. Germanà 1994). Even changing attitudes, however, cannot reconstitute bones that have been subject to three thousand years or more of decay. Even the most careful excavator rarely encounters contexts from which relatively intact skeletal remains can be retrieved. The elaborate tombs which often provided the best environments in which bones were preserved from the elements of deterioration have long since been excavated, and useful collections of skeletons from these contexts are rare (e.g. at Mozia, see Becker 1985). Therefore, even attempts to create a cluster of data by gathering information from various sites into a single "unit" for comparative study (see Musgrave and Evans 1980) generally have been frustrated. Although the pioneering work of Gualdi Russo and Brasili Gualandi (1979) had established a useful database from Sicily, as recently as 15 years ago Borgognini Tarli and Mazzotta (1986) correctly concluded that biodistance studies in Italy remained inconclusive.

Grand schemes developed in the past to study population movements and dynamics, and to review even more traditional questions such as the "brachycephalization" of the Sicilian peoples (see above), have yet to bear fruit. Physical anthropologists continue to provide useful basic information to Italian archaeologists regarding the age and sex of individuals interred within a given necropolis (e.g. Becker and Salvadei 1992). Studies of "occupations" or of population movements through skeletal analysis (cf. Bahn 1997) have been considered only indirectly on Sicily. This may be a fortunate absence as discussions regarding occupation as seen from the skeletal remains remain speculative, and rarely incorporate scientific controls. The analysis of random human bone from a site also provides insights into activities

indicated by archaeological means (Becker 1998b). With these data in hand an excavator can better interpret the mortuary behaviours of the ancients interred at these sites (see Bietti Sestieri 1992a, 1992b).

Skeletal studies from Sicily published during the period from ca. 1900 to ca. 1980, when they include metric data at all, tend to provide only summaries or averages generally unsuited to comparative statistical analysis. The review by Passarello and Alciati (1969) of a series of crania from sites on the eastern part of the island focuses on the problematical archaeological or contextual aspects of this collection and how this influences interpretive anthropological concerns. Since these individual specimens typically have poor provenience data associated with them, the authors did not need to provide specific metric data to implement biological distance studies. By 1980 rapid changes in the attitude toward the recovery of human skeletal materials became evident as a new generation of Italian archaeologists came to recognize the potential of human skeletal analyses for the amplification of their understanding of the past (cf. Tusa 1987). This new generation of archaeologists working on Sicily, often co-operating directly with physical anthropologists, began a more systematic recovery of available skeletal remains and to apply computer methods of analysis (cf. Pacciani et al. 1982). Similar trends are evident on Cyprus (see Fisher 1986). Although some interesting archaeological overviews from Sicily have appeared in recent years, often including extensive data from the island (Leighton 1999), and advances in skeletal studiesusing DNA have become as effectively developed in Sicily as anywhere else in the world.

Over the past few decade a number of physical anthropologists have become interested in, or been called upon to deal with, demographic approaches to ancient populations as established by Acsádi and Nemeskéri (1970). Few of the populations available from Sicily, or for that matter from most archaeological sites, provide sufficient numbers of individual remains to provide the basis for statistically meaningful results (see Buikstra and Konigsberg 1985; also Boddington 1987). Demographic approaches are rendered even less useful when they are divorced from the archaeological data. The cultural contexts are essential for the reconstruction of ancient behaviors. Other biological approaches, such as those that attempt to evaluate the "health" status of an ancient population, also are of concern to many physical anthropologists (Capasso 1984; but see Mays 1985). Others are interested in the origins and distributions of diseases (see Klepinger 1979, also Brody 1983; Wood et al. 1992), or the presence of cannibalism (see Gibbons 1997). Analyses of element composition of bone using Sicilian populations (Klepinger et al. 1986) are yet to be developed, but the use of bone to assess diet or nutritional status is a rapidly growing specialty (see Fornaciari and Mallegni 1987; Klepinger 1992; but also see Hancock et al. 1989). Studies of DNA and those using blood sera (e.g. Rickards et al. 1992) have yielded uneven results.

Modern concerns with foodways and paleopathology (Fornaciari and Mallegni 1981) have long been a part of Italian physical anthropology. Eastern Sicily had been a central focus of this interest (Passarello and Alciati 1969), but more recently attention to these matters has waned. The basic information that is needed to identify separate "populations" also are essential to the interpretation of these paleopathological data. The problems associated with focused studies of ancient pathologies and ancient diets were quite well defined by Maetzke (1981, see also Waldron 1987).

Recent advances in skeletal research on Sicily

Over the past 20 years the database for Sicilian archaeology has increased enormously. The extensive list of excavations (see Tusa 1983) has continued to grow, but to this day very few archaeological reports are matched by useful skeletal studies. As noted above, until recently few excavators recovered human remains, with the studies of these bones remaining proportionally few in number. Two decades after

Schwidetsky and Ramaswamy's observation (1981) that the primary problem in using new analytical techniques of analysis is the lack of adequate bone samples from which to provide a statistical basis for analysis, their comment remains accurate. This is not simply a problem found in Sicily, but reflects similar difficulties that are noted in peninsular Italy and elsewhere throughout the world.

On the Italian peninsula an excellent recent attempt to place human skeletal studies in context appeared in relationship to excavations at Pompei (De Carolis et al. 1998). De Carolis and his colleagues offer an impressive and complete list of all the human "bodies" identified at Pompei over the years. These data enable physical anthropologists to place findings from the analysis of these skeletons into a larger research picture. Similar programs would benefit every archaeological excavation, but the first requirement is that the skeletal material be recovered.

Among the more important developments in skeletal studies in Sicily is the creation of two new positions in physical anthropology. One is within the Soprintendenza Archeologica in Palermo. The creation of this post, with an office based at the National Archaeological Museum, has led to the development of a laboratory in which skeletal material from various excavations can be studied (Di Salvo 1995c; also Di Salvo and Schimmenti 1998). The presence of this facility encourages the recovery of human skeletal material from archaeological sites for curation in Palermo. The importance of this position in physical anthropology also can be seen in the journal *Sicilia Archeologica*, which began publication in 1968. Pelagatti's (1976) landmark call for the study of Sicilian skeletal populations first appeared in this journal. The first human skeletal study appeared in *Sicilia Archeologica* eight years later (see Di Salvo 1984c). Since 1984 a number of publications focusing on human skeletal remains have appeared in *Sicilia Archeologica* and the importance of these data has been recognized by the editor and his associates.

More recently the second important post relating to human biology has been created at the University of Palermo within the Dipartimento di Biologia Animale. The first appointee is bringing modern analytical methods and interdisciplinary approaches to bear on questions of human biology on Sicily (see Sineo et al. In press A). These approaches, using molecular biology, commonly focus on DNA studies of various types. These lines of research also require extensive co-operation among numerous scholars in programs that are having important effects on the interdisciplinary nature of research involving human biology.

Chronology

Time and space considerations are as essential to the interpretation of human skeletal remains as they are to the interpretation of the archaeological materials with which these bones commonly are found. For chronologies readers are specifically referred to the work of Tusa (1994, 1997a: 647-653), and also should consult Whitehouse (1994), and Skeates (1994; see also Brown 1992). The locations of many of the sites noted in this collation (see Fig. 1) derive from a number of sources. Di Salvo and Germanà (1997: 586) provide a good map locating sites from which skeletal materials are known of Bronze Age and earlier dates. An excellent series of "thematic" maps is provided by Tusa (1997a: 626-643). Good site locations, arranged in chronological order, also are provided by Leighton (1999: 23, 53, 89, 115, 148, 189, 220).

The following survey of skeletal studies from Sicily places each of them into a general temporal category as provided by the individual authors. Leighton provides the caution (1996c: 101, 1999) that the dating of these sites is not finely tuned despite considerable progress in recent years. No attempt is made here to evaluate the archaeological or other bases used in establishing these timeframes, nor is any attempt made to deal with the extremely complex chronological issues that are now of great interest in Sicilian archaeology. Terms such as "Early Iron Age" and "Protohistoric Period" increasingly are used for aspects of what had been called the

Archaic Period. The earlier use of a sequence from the Geometric to Archaic to Classic periods should be noted when consulting the early literature. Increasing use of direct dating techniques have provided better alignment of various periods in the contemporary literature.

Individual papers noted in this summary have been afforded minimal commentary. The primary goal here is to provide a brief overview of work done to date together with note of a few general papers with content bearing on the situations found in Sicily. Individual researchers may use this collation as a background for their specific data from specialized projects. Each scholar will need to review the relevant literature and to determine which papers have value or applicability to their own research.

Sicilian skeletal studies: a chronological review

Evidence for very early human skeletal remains, or the human paleontological finds from Sicily supposedly indicating the presence of species ancestral to *Homo*, remains unsupported. Claims to have discovered the remains of early hominids such as *Oreopithecus* on Sicily (Carnieri 1994) are confused by contextual issues (as in Fabbri and Carnieri 1997) as well as by interpretation. Other claims regarding early primates have been well discussed elsewhere. For example, a series of specious claims regarding the discovery on Sicily at Mandrascava (Agrigento) of the remains of "pre-human" fossils, said to be evidence of *Homo erectus*, are dismissed in thoughtful reviews by Antonio Radmilli (1984, 1985). Although no extremely early human fossils are known from the island, some extremely interesting Paleolithic cultural material has been identified (see Tusa 1994: 99-100). The extent of later period Paleolithic finds grows incrementally greater through time and is summarized below. The more specific dating of many prehistoric sites (cf. Graziosi 1950) and thereby their skeletal and artifactual contents, remains a problem now being addressed by a number of scholars (e.g. Skeates and Whitehouse 1994).

Paleolithic

The considerable extent of the Paleolithic period occupation of Sicily is represented by numerous finds of stone tools. In addition, there are known an even larger numbers of sites dating to later periods documented by Piperno's several contributions to Tusa's archaeological survey (1997a). This wide distribution and considerable density of Paleolithic period archaeological sites on Sicily (see Segre and Vigliardi 1983; Piperno 1997) is not matched by finds of contemporaneous human skeletal remains. The paucity of human bones is expected from this very early period due to accidental or inadvertant damage that has been done to many of these early sites, and also from the results of normal geological factors. The early geological history of Sicily, particularly during the last glacial epoch prior to the considerable rise in sea level, suggests that many of the early sites and their associated skeletal remains now are below the sea. The considerably greater surface area that was Sicily was considerably reduced during the rise in sea level some 15,000 to 20,000 years ago. Recent studies of caves and rock shelters (e.g. Giannitrapani and Pluciennik 2001) provide potential for expanding this line of research back in time. Together these data provide the basis for a long cultural history of the island, leading to a common conclusion regarding the autochthonous development of those cultures found on Sicily during the later periods and into the Bronze Age when Mycenaean trade contacts were multiplying.

Since the publication of Passarello's (1970) pioneering review of human origins in Sicily relatively few new findings have come to light regarding the earliest human occupation on the island (see Mallegni 1993, Tusa 1994: 100-101). Orban (1988) effectively carries forward Passarello's research into the Paleolithic period by providing data and full references for the remains from Cervi (Late Würm), from the southern shore of the Lévanzo island west of Trapani (Orban 1988: 13-14), and for the Fontana Nuova site (Aurignacian).

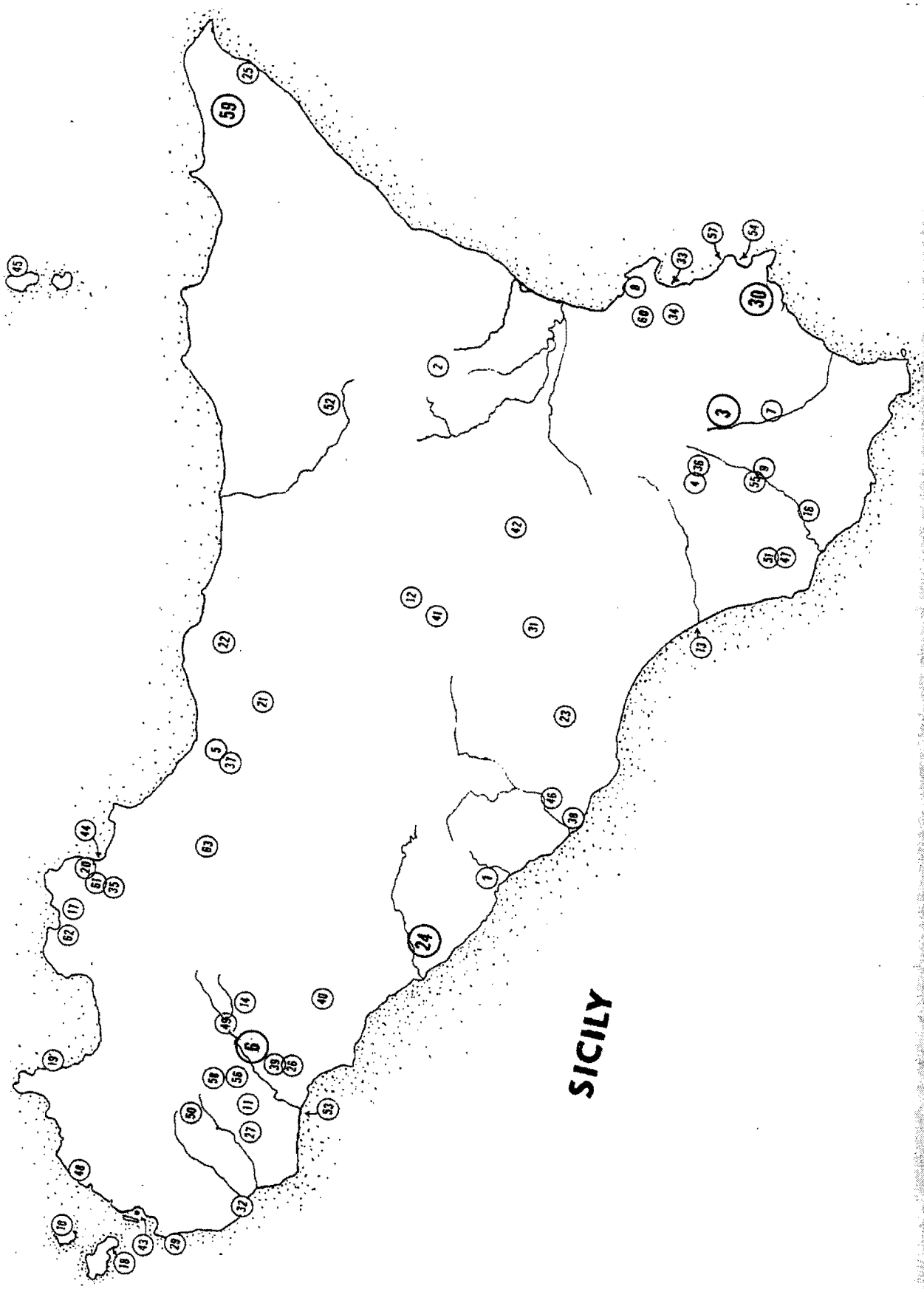

Fig. 1 - Map of locations noted in text.

LEGEND OF FIGURE 1

Archaeological sites from which human skeletal material has been studied, coded for the map (alphabetical order). For detailed archaeological site locations in Sicily, see Leighton (1999), Procelli (1981), S. Tusa (1996c: Tav. 24), Whitehouse (2001), Guidi and Piperno (1993); Di Salvo and Germanà (1997: 586) also provide extremely useful maps with site locations; Di Salvo (1994: 235) locates some of the sites in the Belice Valley.

Note that this map includes several locations marked by numbers of larger size. These had been added to the second version of this map, or represent relocations of sites from the position indicated in the earliest version of this survey (Becker 1995-96).

Ideally a table should be created listing these sites, each followed by the reference(s) to skeletal studies, the names and dates of the cultures represented, and the number of individuals represented by the skeletal material studied. Most distressing in this survey of the literature is the absence of much of this basic information from so many of the published reports. I urge all futures scholars to be careful to include these basic data in their skeletal reports.

1. Agrigento
2. Biancavilla
3. Calaforno (cf. Tusa 1996c: Tav. 24). The location as indicated here is approximate.
4. Casmene (see Monte Casasia); south of Lago Dirillo.
5. Castellaccio (see Monte Castellaccio)
6. Castellazzo: Monte Castellazzo di Poggioreale (Becker 1998c). Cf. Monte Castellazzo which is 5km from Marianopoli near the borders of Caltanissetta, Agrigento and Palermo (De Miro and Fiorentini 1980: 128)
7. Castelluccio (Siracusa): Located between the rivers Anapo and Tellaro (see P. Orsi 1923, Procelli 1981: 96). Cf. also Castelluccio, which is just inland from Gela (and No. 8, below).
8. Castelluccio presso Lentini. Note where S. Tusa (1996c: Tav. 24) locates his Castelluccio (No. 44 on his map).
9. Castiglione (area of Ragusa)
10. Cervi (on Lévanzo Island, west of Trapani).Ciavolaro (in southwestern Sicily)
11. Contrada Marcita, near Stretto (3 km. from Castelvetrano, TR) Contrada di Paolina (see Ponte di Paolina) Cozzo Busone, Grotta di (Whitehouse 2001: 56, no. 44)
12. Cozzo S. Giuseppe (Calascibetta, Enna)
13. Dirillo River Valley (Southeastern Sicily)
14. Entella.
15. Fontanazza. Located by Guidi and Piperno (1993: Tav. III) to the south of Catania and near the coast (but, see Tusa 1996c: Tav. 24, following p. 204).
16. Fontana Nuova (on Irminio River, near Marina de Ragusa)
17. Grotta dei Cocci (near Capaci, Palermo) Grotta del Genovese Levanzo (Whitehouse 2001: 56, no. 39) Grotta dell'Addaura (Whitehouse 2001: 56, no. 41) Grotta di Cozzo Busone (see Cozzo Busone) Grotta del Kronio: see under Kronio
18. Grotta dell'Oriente, on the Isole Favignana.
19. Grotta dell'Uzzo (Trapani), above Tonnarella dell'Uzzo (Whitehouse 2001: 56, no. 40).
20. Grotta del Vecchiuzzo (presso Palermo)
21. Grotta di Scillato Grotta Molara (Tusa 1996c: Tav. 24); see under "Molara."
22. Isnello (Cefalù). Due south of Cefalu', including the grottoes of Fico and Chiusilla.
23. La Muculúfa: northeast of Licata.
24. Kronio (also, Grotta del Kronio). Lillibaeum: Ancient Marsala (see No. 29). Manuzza-Selinunte (see Selinunte)
27. Marcita, Castelvetrano (Trapani).
28. Marmo (specific location unknown).
29. Marsala (see Lillibaeum)
30. Matrensa, near Siracusa (see Tusa 1996c: Tav. 24).
31. Mazara (eastern Sicily)
32. Mazara dell Vallo
33. Megara Hyblaea.
34. Melilli (Siracusa): Between Monte Crimiti and Monte Iblei, and between the rivers Anapo and Mulinello (cf. Tusa 1996c: Tav. 24).
26. Menfi.
25. Messina
35. Molara (presso Palermo): Just east of Monreale. Also, Grotta Molara (Tusa 1996c: Tav. 24; also Whitehouse 2001: 56, no. 42).

36. Monte Casasia (Ragusa); south of Lago Dirillo (see Casmene, above).
37. Monte Castellaccio: East of Termini Imerese (on the coast southeast of Palermo), near Monte S. Calogero.
38. Montechiaro: Castello di Montechiaro, is near the coast, east-southeast of Palma di Montechiaro (which is southeast of Agrigento). Monte Castellazzo di Poggioreale (see Castellazzo).
39. Monte Cronio (near Menfi).
40. Monte Luna (inferred location).
41. Monte Rossomanno (presso Enna), location approximate.
42. Morgantina
43. Mozia, Naxos: an eastern site of the Protohistoric Period situated along the north coast at the far western end of Messina province, north of Mt. Etna. Noto (SR): a small town southwest of Siracusa.
44. Palermo
45. Piano Conte: A "Pianoconte" is located in the center of the Isola Lipari.
46. Piano Vento: Territory of Palma di Montechiaro (Agrigento). 24. Pietralunga (west of Paternò).
47. Ponte di Paolina (also Ponte della Paolina, and Contrada di Paolina). Located between Ragusa and Santa Croce Camerina (see Santa Croci). Cf. Tusa 1996c: Tav. 24.
48. Roccazzello (Trapani). See Trapani (also No 58, below).
49. Salaparuta (Trapani).
50. Salemi (Trapani)
51. Santa Croci (near Contrada di Paolina: see Procelli 1981: 107). See Ponte di Paolina.
52. San Teodoro: At Acquadolci on the north coast, at the far western end of the province of Messina. The paleolithic site is located within the Grotta di San Teodoro near a very small town ca. 23 km. WSW of Messina, and less than 5 km. northwest of Monte Dolce (Catania; see Whitehouse 2001: 56, no. 43).
53. Selinunte (TR)
54. Siracusa. Sites such as Vulpiglia are located in or near the modern city.
55. Sperlinga (area of Ragusa; cf. Neolithic Riparo di Sperlinga in the northeastern neck of Sicily (Tusa 1996c: Tav. 24).
56. Stretto-Partanna (TR): 3 km. from Castelvetrano.
57. Thapsos: on the northern tip of the Penisola Magnisi, immediately north of Siracusa. See Bernabó Brea (1958) for tomb types.
58. Timpone Pontillo (near Santa Ninfa, TR)
59. Torrente Boccetta (Messina; see Scribona 1987). Trapani (listed as no. 48, see above)
60. Villasmundo
61. Uditore: immediately west of Palermo.
62. Ulina: On the eastern side of the Belice River, a few kilometers northeast of Poggioreale. Vecchiuso (listed under No. 20: Grotta dell Vecchiuzzo).
63. Villafrati Vulpiglia: In the area of Pachino (but, see under Siracusa, No. 54. Cf. Guerini 1991; Becker Ms. B).

The rock shelter called Fontana Nuova, the southernmost known Aurignacian site in Europe, is on the right bank of the Irminio river near Marina di Ragusa in southeastern Sicily (Orban 1988: 19-20; also Bernabò Brea 1950). Fontana Nuova yielded impressive Aurignacian cultural remains, dated to 40,000-32,000 BP, found in association with a few bits of *Homo sapiens* skeletal material (Chilardi et al. 1996: 560-562). The paucity of early skeletal material found in this shelter reflects the relative rarity of Paleolithic skeletal findings for all of Italy (see Mallegni 1992; also Stiner 1991, Bonfiglio and Piperno 1996). Also of interest at Fontana Nuova is the claim that the earliest excavators reburied, before 1914, animal and human bones found in this rock shelter. Bernabò Brea's 1949 excavations retrieved the bones. Chilardi and his collegues claim that these bones were inventoried by Luigi Cardini and published by Bernabò Brea (1950: 138-139), but the published text simply notes the presence of a few bones and two teeth of what appears to be a single individual *H. sapiens*. Of note is the citation by Bernabò Brea (1950: 133) of a map of the site taken from de Vaufrey's *Le Paleolithique Italien*, fig. 38; a volume that I have been unable to locate (but see Guidi and Piperno 1993: 522-523). Both Paleolithic and Mesolithic period burials from throughout Italy are the subject of Mussi's (1986, also

2001) general studies. The limited evidence from Sicily forms an extremely small portion of her considerable database (see also Leighton 1999: 36-38; Camps and Olivier 1970).

San Teodoro

The human remains from an Upper Paleolithic context at San Teodoro (Acquadolci, Messina) provide the earliest and best known early human skeletal sample known from Sicily (Oakley 1977: 256-7). The first of the human remains to be recovered from San Teodoro, all clearly *Homo sapiens sapiens* (modern humans), were excavated by Baron Francesco Anca in 1859 (see Anca 1860, 1867). Baron Anca's early excavations were as interesting as his life (Di Stefano 1887), which reflects the vibrant intellectual history of this island in the 19th century. Oakley provides the best data for locating this site. Originally the S. Teodoro skeletons were believed to represent five adult individuals, but at present at least seven different people can be identified among these remains (Fig. 2).

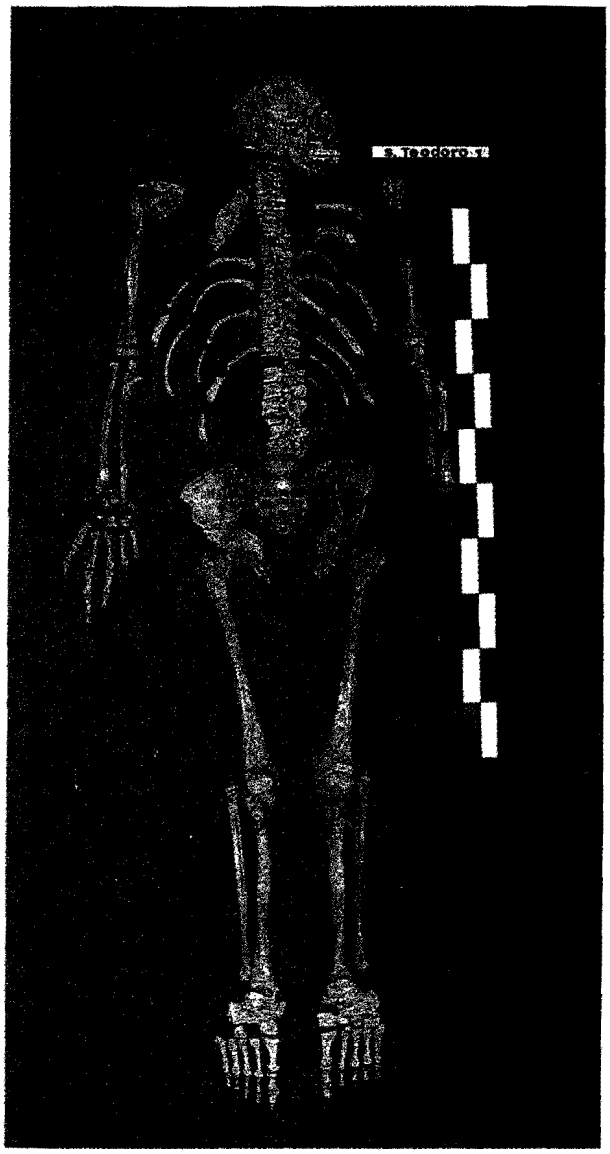

Fig. 2 - S. Teodoro 1, the most complete skeleton from this site.

One of the first "modern" descriptions of the human bones recovered from the excavations at San Teodoro was published by Maviglia (1940). Graziosi (1943, 1947) also reviewed the S. Teodoro bones, providing an important description of what was then believed to be a single Paleolithic period Sicilian population. Graziosi also indicated the rarity of such finds. A recent report (Bigazzi et al. 2001) regarding human skeletons from a possibly Upper Paleolithic context within the province of Palermo offers an indication of an important new series of individuals from a period for which little is known.

The archaeological section drawing depicting the "Epigravettian" site at the Grotta di San Teodoro that is provided by Graziosi (1947, reprinted by Di Salvo and Germanà 1997: 586, fig. 2) offers no clues regarding the complex stratigraphy suggested by the recent findings of Luca Sineo and his colleagues (see below). Sineo's important results now place the San Teodoro remains into at least two distinct and widely separated time periods. Lithic studies had placed the S. Teodoro remains within the Upper Paleolithic period (Vigliardi 1968; Segre and Vigliardi 1983; see also Leonardi 1939, 1941; Maviglia 1942). The date of 11,000 BP cited in a popular account (Bahn 1997) had appeared to be far too recent until the recent discoveries made by Sineo et al. (In press A). The non-human vertebrate fossils from this cave can be placed into a general Late Pleistocene period and the cultural material appears to derive from the Late Gravettian era (Burgio and Di Patti 1990). Charcoal recovered from a "hearth" (Lona 1949) may provide clues to more precise dates (see also Tricomi 1938). The important research recently conducted by Luca Sineo et al. (In press A) using Direct Gamma Spectrography (U/Pa) to test ST1 and ST2 produced an "astonishing result" regarding the range of differences in the ages of skeletons that had heretofore been generally considered as contemporary by most investigators. Their findings, based on new methods pioneered by Cavagna et al (1995, also Berzero et al. 1997) point out the need to conduct careful excavations at all sites and to record the findings with extreme care. Sineo et al. found that ST2 dates from 20,000 years BP (± 6000) while ST1 should be dated to 10,000 ± 3,000 years BP, or in the Mesolithic period (see below). The date for ST2 is closer to what had been expected for all of the San Teodoro remains, and now indicates that continued non-destructive testing of these individuals is in order.

The earlier studies of the San Teodoro remains need to be reviewed in the light of these new findings. After the initial research with the various materials found at San Teodoro, Correnti (1968) had conducted further studies of the San Teodoro human skeletal material. Subsequent excavations at S. Teodoro yielded impressive faunal samples (Bonfiglio 1986, 1987, Bonfiglio et al. 2001), but no further human remains. Burgio and Di Patti (1990:8, 10-11, fig.4) make reference to the human bones from the site in their report on the animal remains and also provide a review of the earlier literature.

Fabbri's (1993) excellent evaluation and his reconsideration of the four San Teodoro skeletons that now are identified as ST 1 through ST 4 had provided a useful complement to Graziosi's (1947) study of ST 2, 3 and 5. Fabbri's work also augments Pardini's (1975) work with ST 6, and also helps us to understand Aimar and Giacobini's (1989) important definition of ST 7 (see also Fabbri 1989). Di Salvo (1997, II: 15) discusses the San Teodoro I (ST 1) skeleton, which along with the ST 2 skull, is curated at the Institute of Geology, Corso Turköry 131 in Palermo. Di Salvo's work was done prior to the appearance of the results of Sineo's significant review (Sineo et al. In press A; also, see below).

San Teodoro 3 and 4 are at the Museo Fiorentino di Preistoria (via S. Egidio 21), Firenze. The present locations of ST 5 and the other skeletons have been explored by Sineo and his colleagues. A recent note (Bahn 1997) indicates that Fabbri is studying bones from San Teodoro at the University of Pisa, suggesting that at least some of these bones are curated there. Sineo and his team are planning an important program of study that will include all of these remains and may provide dates that clarify their relationships.

Fabbri's important contributions include the recognition that there are females among these uniformly robust individuals. This is consistant with other Paleolithic populations as well as many recent foraging populations from all over the world. Robert Leighton (1998) reviews the subject of sex evaluation as it applies to the robust population of the Upper Paleolithic, and specifically with regard to the San Teodoro skeletons. A. M. Haeussler has focused her study on the teeth of the two San Teodoro specimens on those curated at the Institute of Geology as part of her project involving paleolithic populations throughout Europe (pers. Comm. 27 April 1995). Her Mediterranean sample remains small, but provides interesting clues to relationships among these early human populations. Carnieri (2001) is conducting dental wear research on these teeth for his doctoral dissertation.

Mesolithic: Ca. 12,000 – ca. 7,500 BCE

The most important and exciting recent discovery relating to the Sicilian Mesolithic is the date now assigned to the San Teodoro 1 skeleton (ST1) through Direct Gamma Spectromety (Sineo et al. In press A). The date of 10,000 ± 3,000 years BP suggests a Mesolithic age for materials that traditionally had been considered coeval with all of the other San Teodoro skeletons, of which the ST2 remains have now been dated to 20,000 BP (see above). The ramifications for this discovery are now being explored, but the fact that the most complete of the San Teodoro skeletons is the most recent provides some clues to the archaeological history of the site. Most likely San Teodoro 1 intruded through one or more of the earlier burials in this cave, all of which may be relatively contemporary. Thus ST1 remained relatively undisturbed until discovered, while the previous interments were subjected to at least one if not many disturbances from subsequent burials and perhaps other activities at the site. The fact that these Mesolitic people found this cave to be a desireable location for burying their dead is not surprising given the evidence for earlier burials that now can be seen as culturally unrelated.

The bones from the nearly complete Mesolithic skeleton identified as San Teodoro 1 (see Fig. 2) now are featured in an impressive display at the Institute of Geology in Palermo. During the spring of 2001 it had been part of an exhibit in Naples (Di Salvo, pers. comm.) but it has since been returned to the paleontological display at the new museum named for G. G. Gemmellaro.

All of the better known Mesolithic sites in Sicily are noted by Mussi (1986, 2001). Her overview of the Italian Mesolithic, conjoined with her work on the Paleolithic, makes note of the Sicilian data, with a focus on the archaeological remains. Of note are the Grotta dell'Uzzo excavations, near Trapani. These are extremely important because the data provide insights into the transition from the Mesolithic to the Neolithic in northwestern Sicily (Cassoli et al. 1987; also S. Tusa 1976). The excavators of this site, which generally is dated to ca. 9,000-7,000 BCE (but, see Piperno 1985; Belluomini and Delitalia 1981), were extremely prompt in publishing their results (Mannino 1973, Segre and Piperno 1975, Piperno and Tusa 1976, Piperno, Tusa and Valente 1980, Piperno 1984-85). They also were very careful to involve physical anthropologists and other specialists to study categories of materials recovered from the Grotta dell'Uzzo, with unusual burial contexts given special attention (Piperno 1976).

The limited skeletal material recovered from the Grotta dell'Uzzo has been studied extensively, primarily by Borgonini Tarli (1980, see also Borgonini Tarli and Repetto 1985a, 1985b, 1985c: 21, 26, Fig. 19, 1986; Repetto 1982/3). This research has been summarized quite well by Borgonini Tarli et al. (1993), and they also provide a useful bibliography. Di Salvo (1996) also provides a summary of these data together with a useful bibliography relating to the actual excavations, the finds of animal bones, and other contextual information relating this site to the Neolithic revolution on Sicily. Di Salvo and Germanà (1997) believe that there were ten primary burials of which two had double bodies (N=12). They suggest that nine adults and three children are represented, but note only four adult males and two adult females. The

presence of an infant (age 4-6 months) from Uzzo III is noted by Di Salvo (1997: 16-17). For the parallel study of animal bones see Tagliacozzo (1993).

The many direct studies of the few individuals represented by the Grotta dell'Uzzo human remains are complimented by useful investigations of dental microwear (Borgonini Tarli, Della Santina and Repetto 1988) as a prelude to the study of the Mesolithic diet (Borgognini Tarli, Della Santina, et al. 1989). Trace element studies by Francalacci (1988; see also Francalacci and Bogognini Tarli 1988) provide an excellent complement to this line of research (see also Costantini 1981). Even a suspected kidney or bladder stone from a woman in the Grotta dell'Uzzo has received considerable attention (Naccarato et al. 1996, Fornaciari and Benedetti 1997). Unfortunately, Borgognini's (1976b) relevant paper presented at the IX Congress in Nice does not appear in the *Actes*. Collectively this co-operative scholarly effort represents an ideal to the study of a human population from a specific site. This comprehensive program is rarely duplicated anywhere in the world.

Grotta della Molara, Palermo

The only other significant Mesolithic human skeletal material from Sicily derives from the Grotta della Molara (Palermo). Since very little Mesolithic period material had been known from Sicily, early authors relied on comparative data from peninsular Italy (Tusa 1992: 68, 1994: 100-101). Significant changes in this small database have been provided from recent studies of the skeletons from the Grotta della Molara, supposedly of two adult males from two primary interments plus a third person (Di Salvo and Germanà 1997: 587, 591). These all are dated to ca. 8,600 BP (Tusa 1992: 68).

A cranium from Molara, near Palermo (Mannino 1975), was studied by Borgonini Tarli (1976). However, her findings are rarely cited for comparative data. The postcranial material from the Molara skeleton appears to have been transferred to the Istituto Italiano di Paleontologia Umana in Rome. Recently, Canci et al. (1995) have begun to publish information derived from the Grotta della Molara skeletons, which appear coeval with, but less numerous than, the Grotta dell'Uzzo remains (see also Borgonini Tarli et al., 1993). The dates for the skeletal material from the Grotta della Molara have been evaluated by Borgognini Tarli and Repetto (1985c: 18; also Repetto 1982/83) at 7,000-8,000 BP (ca. 6,000-5,000 BCE). These dates suggest a Neolithic period orientation. Resolution of these dates, as well as evaluations of stature (see below) will form an important focus for future research.

The transition from a "Mesolithic" hunting and gathering economy to a "Neolithic" or agricultural economy on Sicily is believed to be represented by the materials from the Grotta dell'Uzzo. This cultural transition to a Neolithic economy is a major development in the culture history of Italy in particular (Barker 1985), as it is in any part of the world. The transition on Sicily is discussed by Tusa (1985, 1995; for relevant dates see Skeates 1994: 263), but an understanding of this process requires more archaeological as well as biological data and evaluation. Fornaciari's (1982) general comments address the Mesolithic to Neolithic transition, but the data documenting biological changes during the transition are only now being gathered.

Neolithic: Ca. 7,500 BCE

The important Mesolithic to Neolithic transition in Sicily, noted above, continues to be a subject for strenuous debate within the Italian archaeological community. These matters are of great importance in framing questions for physical anthropologists since matters of dietary shifts can be directly studied through biological remains. Various modern analytical tests can provide further information that may reflect this transition to agrarian economies. The date that has been suggested here for the beginning of the Neolithic is assigned purly as a means of helping to orient the reader to the survey that follows.

As early as the 1880s archaeological evidence was identified that indicated the presence of several diverse Neolithic cultures on Sicily. Various notes relating to

contemporary archaeological activities appeared in the *Bollettino di Paletnologia Italiana*, indicating that G. Sergi was then collecting human skeletons from Neolithic sites on Sicily. Among the skeletal remains collected at that time were at least seven crania from the Bronze Age site at Castelluccio, one of the many Bronze Age sites then called "Neolithic." The confusion between sites of the Neolithic period and those of the Bronze Age was noted as a problem by Nicolucci and other scholars in the 19th century, and remained a terminological challenge well into the 20th century. While Sergi (1895a, also 1900) described these bones as being from the "Neolithic" period, it now seems likely that they came from the well known Early Bronze Age site of Castelluccio (R. Whitehouse: pers. com.; see in Becker 1997b).

Bernabò Brea (1984) offers some early indications of what he believed to be "Neolithic" period settlement patterns on Sicily, but his data also may apply to Early Bronze Age sites (cf. Mallegni and Usai 1996). For a recent overview of the archaeology of the Neolithic period on Sicily see Whitehouse (1994b). Tusa (1996c, 1996d) offers helpful data on site location and chronology and provides an archaeological perspective. The data on human biology relating to the Neolithic period are discussed by Morter and Robb (1998). They also relate space, "gender" and architecture in southern Italy, including Sicily, during this period. Their work reflects useful applications of human skeletal data in the reconstruction of ancient cultures (cf. Robb 1999).

Recent work on skeletal remains from sites that are more certainly dated to the Neolithic includes an excellent overview by Facchini, Brasile Gualandi and Cavicchi (1984). Robb (1994a, 1997) reviews south Italian Neolithic period skeletal studies in an effort to put the rapidly growing database into a modern analytical framework. Robb's tudies cover most of the earlier published reports relating to the human skeletal remains from the Neolithic of Sicily (see also Cafici 1932, 1938; Castellana and Mallegni 1984, 1985, 1986; Mallegni 1985-86, 1987; Becker 1995c; also C. Cafici 1915). Robb's recent survey focusing on the Neolithic period skeletons in Sicily, begun in January of 2001, will provide an important set of data from this pivotal period in Sicilian prehistory. In addition, Mallegni and Usai (1997: 234) note a forthcoming paper reviewing various studies of human skeletal remains of the Neolithic period in Sicily (Mallegni et al., Ms. A). Their work focuses on the studies of the island's populations in ways that have been extensively reviewed by Robb (1994a, 1997). Even more recently D'Amore et al. (2001) studied the Neolithic period human skeletons from the Grotta di Porcospino in the area of Palermo. The preliminary announcement of this research also offers the promise of adding an important new population of Neolithic date to the Sicilian record. This Neolithic population will provide a basic set of information for this site as well as a critical set of comparative data.

Di Salvo and Germanà (1997: 595) identified the human remains from Trincea-Fossato di Stretto-Partana as the only Neolithic period skeletons then known on Sicily. They place the four skulls and bits of post-cranial remains in the "Neolitico medio." Tusa (1992: 145, 206-211; 1999) notes that dates from ca. 5200 to 4300 BCE were assigned to the Trincea-Fossato di Stretto-Partana archaeological materials, suggesting a Middle to Upper Neolithic correlation for any related human remains (see Di Salvo 1994b: 223-224; 1999). The Upper Neolithic period in this region may date from as early as 4500 BCE.

Tusa (1983: 124) places all of the cultural materials from the Grotta del Vecchiuzzo (near Palermo) in the Upper Neolithic period, based on the presence of a "Diana" type ceramic assemblage (see Collisani 1975). These ceramics now are dated to ca. 4,000-3,500 BCE (Leighton 1996a; Tusa 1994:103). Di Salvo and Germanà (1997) also place them in the Copper Age. Becker (1995) identified remains representing at least 16 people from among the collected human bones, but all were fragmentary and suggest that they came from one or more secondary deposits.

Well-preserved skeletal material was recovered from two of the three Neolithic period graves at Vulpiglia (Siracusa) excavated by Lorenzo Guzzardi and his colleagues during the late summer of 1991. These bones, including one skull that may be reconstructable, were subjected to a preliminary review in January of 1992 (Becker

Ms. B). Guerini's (1991) studies of the tombs from Vulpiglia also should be noted (see also Di Salvo 1994b). Precisely where in the Neolithic sequence these bones should be placed remains to be determined. The vast necropolesis at Villasmundo (Siracusa), excavated by Dr. G. Voza, include at least one group of tombs of Neolithic date (see Sluga Messina 1988). No human remains appear to have been recovered and conserved (but, see the review by Di Salvo and Germanà (1997: 595).

Mingazzini (1937), the excavator, had placed the materials from the Grotta del Vecchiuzzo within the Late Copper Age based on his evaluation of the ceramics. Mingazzini also considered the quantities of human and animal bone from this cave to be indicative of "cultic" functions. Bovio Marconi's (1975, 1979) participation in this excavation, and her detailed analysis 1979, led her to cast doubt on Mingazzini's interpretation that this mix of materials reflected the use of this cave for ritual, but non-mortuary, activities (see also Bovio 1944, 1950, 1975 for the development of her ideas). Bovio's conclusions regarding the site's functions are supported by the analysis of the human remains from this location (Becker 1995c). The skeletal analysis suggests that the cave was primarily a burial site. Both Bovio's and also Becker's conclusions support Tusa's belief that these remains in the Grotta del Vecchiuzzo date from the Neolithic period (see also Becker 1986:35).

Note may be made that Castellana and Mallegni (1984, 1985) report on the site of the Neolithic village at Piano Vento, in the territory of Palma di Monte Chiaro, Agrigento (Montechiaro). They provide important comments on the human skeletons that were recovered (see also Mallegni 1985-86, 1993; also Castellana 1985, 1993). The Piano Vento necropolis may date from the Final Neolithic period, and also may have an "Eneolithic" (Copper Age) component (see also Fornaciari and Bartoli 1995; Fornaciari and Cecchi Parenti 1993; cf. Tusa 1994: 101-105; also Mallegni In press A). Castellana's (1995) more recent work on the archaeological data "provides the basis for our knowledge of the late Neolithic and early Chalcolithic Sicily" according to Lukesh (2001: 134), but I find the scant data to be interpreted in unusual ways. Copper Age tombs from the "site" or area of Piano Vento are noted below. Fornaciari has commented on paleonutrition using the skeletons from the Piano Vento necropolis. Di Salvo and Germanà (1997) use only Riquet's (1970) report for information for their reviews of skeletal material of the "Neolithic" period. Interpretations of the meaning of Neolithic funery customs on Sicily, and therefore of the interpretations regarding this skeletal material, profits from Ruth Whitehouse's data from southern Italy (1991, also 1992).

Copper Age (Chalcolithic/Eneolitico)

The difficult problem of making temporal distinctions between the Neolithic, the "Copper Age ("Eneolitico") and the Early Bronze Age as recognized by Nicolucci over 130 years ago (see Appendix I). Definition of what constitutes the "Copper Age" on Sicily, within which we generally see placed the "Conca d'Oro" culture in the region of Palermo (see Bovio Marconi 1944, Cassano et al. 1975, Tinè 1960-61; Quojani 1975), has altered significantly in recent years (Tusa 1994a: 101-105, 1996e; see also Tusa and Di Salvo 1988-89). S. Tusa (1997b) discusses two phases of the Eneolithic Bell Beaker culture on Sicily. The earlier phase is defined as the Conca d'Oro culture, while the later is identified as Malpasso-Chiusazza culture. Further archaeological work will better define the Copper Age, and the several cultures involved.

Further complicating the matter of assigning dates to various Copper Age burials is a finding regarding the rock cut tombs that were common in the Early and Middle Copper Ages of Sicily (Pottino 1981, Mannino 1983). This tomb form continued as a type of burial chamber used through the Bronze Age (see Bernabò Brea 1958) and into the Iron Age (Whitehouse 1972). Whitehouse (1972) demonstrated that oven shaped rock cut tombs began to be carved in Sicily by the Early Copper Age as small chambers for individual burials, but generally evolved into collective tomb chambers by the Late Copper Age (see also Becker 1986: 34-35, 51-53). Collective tombs,

reflecting ancient mortuary behaviors, often are found with extensive damage done in antiquity to those skeletons that had been piled together. Such cultural activities create excavation problems that are not easily solved. However, the bones from the rock cut tombs of apparently late date in the necropolis of Cozzo S. Giuseppe at Calascibetta, near Enna (Albanese 1985) have yet to be studied (see also McConnell 1988).

The shape of these Copper Age "bee hive" or oven shaped tombs might appear to provide an outstanding environment for skeletal preservation, although this may not be the case for several reasons. Note should be made that the "open" environment within large Etruscan chamber tombs, or those that have not filled with earth, has proven particularly destructive to human bones (cf. Waldron 1987). A similar process of demineralization may take place in sealed tombs or caves where the bones become porous and friable in a process not yet understood (see under "Pitrazzi" below). Open caves have another set of problems associated with the survival of skeletal remains, including animal scavenging and disturbance by recent human activities. Taphonomic studies that apply to such disturbed situations also can be used to evaluate bones seen in storage that have been recovered through less than optimal circumstances (cf. Becker 1995c).

Compounding these problems was the widespread ancient practice of removal and separate burial of some skulls, particularly noted during the Copper Age (cf. M. Sergi 1975). An earlier review of the relevant literature (see Becker 1986: 51-53; also Becker 1996d, 1997d) indicated that few human skeletal remains were recovered from the early excavations, and those that were recovered are uniformly in extremely poor condition. This certainly is the case with the skeletal material from Isnello (Becker 1992) as well as from Vecchiuzzo (see below) and other sites. These fragmented remains generally preclude biological distance studies, but careful study of each group enables us to solve archaeological problems and thereby contribute to our understanding of the prehistory of Sicily. The possibility that differential female skull removal would have explained the differential sex ratios has been considered. However, I suspect that techniques of sex evaluation may have produced this difference, rather than Copper Age cultural factors.

Skeletal reports that provide biological information on the people of Sicily from the Copper Age ("*L'Eneolitico*") are varied. Zaborowski's (1905) early survey has long since been superceded. The information collected 100 years ago is often overlooked, but should be included in future studies of this period. Skeletal counts from nine sites are noted by Di Salvo and Germanà (1997: 595-599). Omitted, however, are data from at least two sites, and the assignment of other data sets within this period merits review. Note should be made of work at the Contrada Menta at Milena (CL). Four skulls of various ages and some long bones came from these excavations (La Rosa 1994: 291-295). For the skeletal data see Mallegni et al. (1994: 373-385). Also of note are excavations at Sepolcreto dei Colli (PA) where bits of three skulls were recovered (Parenti 1959: 41).

Clarification of the meaning of each archaeological context will be needed before comparative studies of bones from these various sites can be made. Still, the numbers are so low as to render most evaluations meaningless. Skeletal data published in the early work of Zuckerkandel (1877) relates to the human bones from Villafrati. During a period of extensive cave exploration at the end of the 19th century (see Failla 1891; Giuffrida 1901-2: 345) two Copper Age cave sites were found near Isnello (Cefalù, Palermo). The cave (grotto) sites known as Fico and Chiusilla produced several relatively intact skulls as well as large quantities of badly fragmented human bone (Giuffrida 1905, 1907; cf. Becker 1992). Giuffrida (1901-02) provides statistics on five skulls from Fico (nos. 2580-2584) of which four were identified as male and one a female. Perhaps as many as 100 or more interments had been made at Fico, but the remains seem to have been mixed into secondary deposits in which few skull survived "intact."

Later work at Isnello (Giuffrida 1903) added to the database, but the possibly related site at Chiusilla (Giuffrida 1905) provides a great deal of important information.

Di Salvo and Germanà (1997) list nine male and one female skull plus a number of long bones from the Grotta della Chiusilla. Human remains from Isnello and the Grotta di Scillato (Becker 1992) appear to be of about the same date, with both sites producing human remains in remarkably similar condition.

The evaluations of the human remains from Isnello and the Grotta di Scillato suggest that during the Copper Age many cave sites were used in much the same way as bedrock carved tombs. Natural caves also were used as locations for collective "chamber tomb" type graves (see also Orsi 1898 for data on similar burials in the area of Siracusa). However, the human remains recovered from the Grotta dei Cocci near Capaci (Palermo) represent only one person (see Becker 1995c; see also Andrews 1991). The possibility that the very limited examples of human remains recovered from the Neolithic period on Sicily, including those reported from Castelluccio (Sergi 1891, see also Sergi 1900, and Tusa 1994a: 102) and other sites,t may actually date from later periods needs to be considered.

As Ruth Whitehouse points out (pers. com.) the recently published Copper Age cemetery at Piano Vento, near Palma di Montechiaro (Castellana 1993, 1995) is situated close to the Neolithic settlement in the same area (Castellana and Mallegni 1984, 1985-6, 1986). How much this proximity influenced early evaluations of dates from these apparently separate contexts is not known. Presumably the report of finding remains of 34 males, but only nine women and 13 children, does not reflect a normal population. Another 14 burials of sub-adults are noted (Di Salvo and Germanà 1997), but the archaeological evidence is not correlated with the physical (Mallegni 1995a: 175-196).

Fornaciari's (1990; see also Fornaciari and Cecchi Parenti 1993) discussion of skeletal materials from the Copper Age necropolis at Piano Vento, near Palma di Montechiaro, is discussed above. Piano Vento generally has been described as representing a Neolithic context. Copper Age aspects of this site are suggested by Castellana (1993), and the related human bones have been studied by Mallegni (1993; see also Parenti 1959). Human bones from several "Eneolithic" tombs in eastern Sicily are noted by Spatafora and Mannino (1994) and have been examined by Di Salvo (1994a). These human remains include bones from three oven shaped tombs in the Contrada S. Cusumano near Mazara dell Vallo (TP) and bones from a cave tomb in the Contrada Roccazello at Mazara dell Vallo (TP). This cave tomb in the Contrada Roccazello supposedly yielded 16 people from one layer and two from another layer (Spatafora et al. 1988, Spatafora and Manino 1994). How these remains relate to bones from Roccazzo at Mazara del Vallo (TP; see Di Salvo 1994b: 244-245) is not clear. Three male skulls (only) are among the long bones noted from the ca. 40 chamber tombs at Rocazzo (Di Salvo and Germanà 1997).

Archaeological data relating to the western Sicilian Copper Age in general is reviewed by Spatafora, Mannino and Di Salvo (1988). Prof. Michael Kolb directed, in May and June of 2001, the salvage excavation of what appears to have been an oven shaped Copper Age tomb at Pitrazzi (Salemi, Trapani). The Pittrazzi phase of his larger project revealed what appeared to be a two-chamber rock cut tomb (or a single chamber with two sections) in which at least three flexed inhumations occupied the antechamber. A series of at least four, and possibly many more, disarticulated skeletons with their vessels are in the rear chamber or back part of the tomb. At the time that I visted the site during the course of excavation, through the courtesy of Prof. Kolb and the aid of Dr. Tusa (Soprintendenza Archeologica di Trapani), the relationship between what may be two chambers was not yet clear. In both chambers the skulls and post-cranial remains were in poor condition. Only traces of the head of a left femur could be detected when I troweled the articulated skeleton identified as US 8, and the distal end was completely dissolved. Visual examination of the skeleton plus in situ measurement and estimation of left femur length (515mm) indicate that US 8 held the remains of a robust adult male. Dental wear and loss pattern may permit a more specific estimation of age. The total number of individuals in this tomb context was expected to grow as the excavations progressed.

Castellana's (1997) publication on the Castelluccio culture as represented by findings in the Grotta Ticchiara is accompanied by a preliminary paper on the associated human skeletons from that context. In the skeletal "study" of the bones from the Grotta Ticchiara, Mallegni and Usai (1997:212) suggest that the MNI present is 21 (12 adults and nine individuals of age 15 or less), but no listing is provided. Martínez-Labarga et al. (2000) offer futher information from the Grotta Ticchiara skeletal sample as part of a report that appears in Castellana's later work (2000). A complete listing of skeletal material and comparisons with other Sicilian populations remains to be completed.

Di Salvo's (1998d) brief summary of the Eneolithic period skeletal studies from Sicily, lists what was found at various sites and provides references to the archaeological contexts. Other papers in the same volume provide details regarding various cultural periods. Much attention is given to the description of skull shapes. Also in this volume is a paper by Germanà (1998b) offering a subset of the data in his trepanation volume as it relates to Sicily. A more recent update on Eneolithic skeletal reports from Sicily is forthcoming (Di Salvo and Germanà In press A). Note also should be made of Cipolloni's (1994) review of Copper and Bronze Age skeletal populations in central and southern Italy. La Rosa (1994: 291-295) specifically addresses questions relating to the "nuove indigini" of the "Eneolithic" period at Contrada Menta at Milena (CL), a site represented by several archaeological periods. This report follows La Rosa's (1989) review of "Sicani, Siculi, [and] Elimi" as populations that were inhabiting the island during the period of Greek colonization. These cultural divisions now may be confirmed via various programs employing aspects of molecular biology (see below).

Of particular interest at Isnello (Late Copper Age, or possibly Early Bronze; see Tusa 1983: 386-452 for dates) is the presence of what are believed by some observers to be partial cremations (cf. Becker 1992). Pennavaria (1895: 161) appears to be referring to partial cremations from grotto contexts in the area of Siracusa (see also Orsi 1898: 168, n.2). These may relate to what Barfield (1985: 159-161, 168) suggests may be a common tradition during the Copper Age of peninsular Italy (see also McConnell 1990: 126). The cremations from southeastern Sicily reported by Griffo (1942) may date from this period. The Sikel peoples appear to have used grottoes or caves for collective inhumation burials (Pennavaria 1895, see also Pardini 1976), but how this use relates to rock-cut tombs used during this period is an archaeological problem that remains to be solved.

Recent excavations at Pitrazzi, near Salemi in the Province of Trapani encountered all of the difficulties regarding the assignment of dates to oven shaped tombs plus various problems of skeletal preservation. In 2001 Prof. Michael J. Kolb (Northern Illinois University), a member of a large, multinational archaeological project (Italian-Norwegian-Swedish- American) undertook the recovery of tombs discovered at Pitrazzi during a road-widening program. Bulldozers revealed a small series of oven shaped tombs high on a hillside, and Prof. Kolb elected to undertake a salvage excavation. Prof. Kolb also invited the author to examine the skeletons in situ in one tomb. Unit 8 (US8) held at least three articulated skeletons. These skeletons were delineated by the excavation team by 1 June 2001. I joined the students involved in the excavation and found that the skeletons were in an advanced state of demineralization, with little bone tissue remaining to be recovered. Only portions of long bone shafts and portions of the skull survived in situ. Only through projecting bone morphology was I able to calculate the in situ length of a left femur, by estimating the configuration of the now missing epiphyses. The length (515mm) suggests a robust adult male. Recovery of intact bones was impossible, and even significant portions of skull would be unlikely to be salvaged. No dentition had been exposed. Participation in this excavation revealed to me the many difficulties faced by archaeologists in recovering materials of any use in human skeletal research due to the extent of deterioration of the bone.

Prof. Kolb had earlier noted a burial of Copper-EBA date from the Monte Polizzo area near Mokarta (De Angelis 2001: 197), but whether human skeletal remains

were recovered is not clear. In the face of these difficulties phyiscal anthropologists can only encourage excavators to retrieve whatever material they can, and hope that analysis will provide them with useful information.

Bronze Age

The Sicilian Copper Age was once believed to have extended to at least 1900 BCE, or into the period which in peninsular Italy was believed to be the Early Bronze Age (see McConnell 1992). Now this discrepancy has been eliminated and the Bronze Age is seen as roughly contemporary on both sides of the Strait of Messina. As indicated above, the problem of dating these sites sometimes impinges on the placement of the skeletal remains in chronological order. This requires consideration in any study of biological change using these archaeologically derived populations.

Procelli's (1981) equation of the Bronze Age with the Castelluccio culture of southeastern Sicily has been put into perspective by Tusa (1994: 101-105), who links the Early Bronze

Age with the Neolithic and "Eneolithic" in his review. Recent work by Leighton (1996a) should be consulted for the Bronze Age and other cultural sequencing on Sicily (see also S. Tusa 1996e). Here the dates used for the skeletal remains from sites identified as being from the Bronze Age derive entirely from the reports of the various authors. Evaluations of the specific date of sites sometimes may be unclear. Use of these assigned dates may not produce an accurateect temporal ordering of the skeletal remains. Alden's (1981: 2-3) cautions regarding the use of Bronze Age cemetery data in the Argolid also should be applied to Sicily as well as other parts of the Mediterranean area.

Skeletal data from a number of Sicilian locations identified as Bronze Age in date have been provided over the past 100 years. Sergi (1893, 1898) offers data from Cozzo del Pantano, a site that Vecchi (1969) dates to the Late Bronze Age (see below). Bronze Age skeletal material is best represented from the necropolis at Castiglione (Facchini 1972, 1975) where at least seven chamber tombs yielded remains of approximately 175 people. This is but one of 11 sites dated to the Bronze Age. Di Salvo and Germanà (1997:599-603) offer extensive commentary on the cranial indices. Dating the Villafrati material (Zuckerkandl 1877) has been reconsidered as the specific dates of these sites needs careful attention. Di Salvo's (1998) overview of the Sicilian skeletal material related to the "Campaniforme" brings much of the data together. Not reconsiled are differences presented within many of these papers (e.g. Germanà 1994, 1998a).

Note should be made that some of the earliest DNA studies on Sicily that were directed towards human skeletons derived from contexts using Bronze Age materials (see Martínez-Labarga et al. 2001). This recent method for the study of ancient human remains will be discussed below in a separate section.

Early Bronze Age (EBA): ca. 2000-1475 BCE

Four main cultural groups are commonly identified within the Early Bronze Age in Sicily. These are the Bell Beaker culture (Late Copper Age – EBA; see Tusa 1999: 149-158), the Castelluccio culture of eastern Sicily (commonly called "Castelluccian" in English; see McConnell and Bevan 1999), variants of the Castelluccio culture in western Sicily (Castellana 1998), and the Cape Graziano culture of the Aeolian Islands (see S. Tusa 1994b). The Castelluccio culture had earlier been dated to the period ca. 1600-1400 BCE, but recent evidence has pushed the beginning back by at least 400 years. There are few good radiocarbon dates for this period in Sicily, but the Castelluccio culture has yielded 14C dates of ca. 2300-1700 BC (Skeates 1994: 259-260), approximately the same span covered by the Cape Graziano culture. The Beaker group may have begun a bit earlier and then ran parallel to these other two.

Gilman (1981) reviews the importance of these data for theories concerned with the development of social stratification in Italy. The EBA may be represented by human skeletal materials found in the region of Paternó, with the major site of

Pietralunga located some 3 km. west of Paternó, on a ridge beyond the Simeto River valley on the side opposite Mt. Etna. Pasarello and Alciati (1969) publish information from the necropolis of Dessueri at Monte Canalotti at Gela (CL) where 21 skulls (8 M, 13 F) and numerous long bones are reported (Passarello and Alciati 1969, Panvini 1993-94) as well as from Monte Racello. Both of these sites are considered EBA and assigned to the Castelluccio culture. S. Tusa (1992: 348) places material from Castelluccio at Noto (SR) in the EBA together with remains from Stretto-Partanna (p. 328) and Corvo-Partanna near Trapani (pp. 441-442). The Corvo-Partanna remains may include as many as 30 people in a secondary deposit.

Castellana's (1997) report on the Castelluccio cultural material from the Grotta Ticchiara includes a report on the bones from the collective tomb (Mallegni and Usai 1997). Castellana's Monte Grande report illustrates, in full color, a burial (1998: 31, fig. 18) but no report on this skeleton or any other human remains is included in this publication. Human skeletal materials of the EBA period have been recovered from a funerary deposit in a rock-cut tomb at Stretto-Partanna (Trapani) by Tusa (1999: 158; see also Mannino 1994, Mingazzini 1939). The Grotticella di Stretto Partanna (cf. Tusa 1997a, 1997b, 1999: 156, Fig. 8; also Barfield 1976) is said to include 8 males and 2 females (see Di Salvo and Germanà 1997: 603). The use of chamber tombs for multiple burials, either communal or for extended families, remained widespread in the EBA, with examples reported from as far away as eastern Crete (Becker 1975).

The human bones at Stretto Partanna were found to be associated with pottery of Naro-Partanna type that is often regarded as the western Sicilian version of the Castelluccio wares (Di Salvo 1994b, 1998: 229; Germanà and Di Salvo 1994b; see also Barfield 1994). The human remains include a trepanned skull which appears to have the most extensive example of these ancient surgical procedures known from any part of Italy (see Germanà and Fornaciari 1992; Germanà and Di Salvo 1994b, Germanà 1998). A skeletal analysis of the 28 EBA "adults" (possibly as many as 40) that are represented by human bone fragments identified in a non-burial archaeological context that may have been associated with a *stipe votiva* or votive deposit. The bone fragments are from Ciavolaro near Ribera in Agrigento province, reported by Castellana (1996; see Mallegni et al. 1996: 261; also Di Salvo and Germanà 1997: 603). The study of "paleonutrition" from the bones at Ciavolaro (Bartoli et al. 1996), as many such studies, is not related to any reconstruction of the lives or of the mortuary behaviors of these past populations.

Maniscalco (1996) discusses artifacts and funeral rituals from the "monumental" tombs excavated at Santa Febronia. Di Salvo (1998: 224-226) identifies as "campaniformi" a series of three sites from which human skeletal remains have been recovered. The first is the Grotta Buffa II di Villafrati-Palermo, that Di Salvo and Germanà (1997: 597) place in the Copper Age. From the Grotta Buffa II di Villafrati (PA) there are bits of four skulls and postcranial remains suggesting at least 20 individuals. These are noted by R. Parenti (1959: 40-41, from Zuckerkandl 1877). The second site is the Grotta della Chiusilla-Isnello also in the Province of Palermo, and the third is the Grotticella di Stretto Partanna in the Province of Trapani, as noted above.

A series of skulls, now in Rome, from an EBA necropolis at Castelluccio, the type-site of the culture, has been studied by Vecchi (1969, see also Orsi 1890). These remains may be the same as those reported from the necropolis at Castelluccio that has been identified at Noto (SR), where seven skulls were identified by Di Salvo and Germanà (1997: 603; see Sergi 1891: 157; Tusa 1992: 348). Early Bronze Age skeletal material is also known from another Castelluccio period site at Castiglione (Facchini 1972, 1975). Fragmentary skeletal material from a single tomb excavated at the Contrada Pergola at Salaparuta, Trapani (Mannino 1971) is also considered to belong to the western tradition of the Castelluccio culture (Ruth Whitehouse, pers. comm.). The bones of these few people from Contrada Pergola now in storage at the Museo Archeologico Regionale in Palermo have been evaluated by Becker (1997a).

One of the more important sites of this period, La Muculufa near Butera (CL), has produced a number of chamber tombs (see Holloway 1985). The tomb contexts are described by McConnell and Morico (1990; see also McConnell 1987, 1995; Parker 1985). The fragmentary skeletal materials that were recovered, including some from non-tomb "ritual" areas, derive from at least 24 people; 18 "adults" plus 6 children ages 2-10 years (Corrain and Capitanio 1990). Di Salvo and Germanà (1997:603) provide more specific numbers (12 M, 6 F, plus children). The recovery of human remains from non-tomb contexts is particularly important, although taphonomic processes may have been more important than inferred "ritual" behaviors (cf. Becker 1998b).

McConnell et al. (1990: 124-126) provide an excellent listing of references relating to chamber tombs of this period. Skeletal reports relating to many of these sites are forthcoming. Data from the fragmentary remains of 12 individuals found at the Early Bronze Age site near Salemi, Trapani (Mannino 1981) are of some interest (Becker 1997a, 1998b). More important may be the recent studies undertaken by an international project that recently began a multifaceted project in the area around Salemi with the goal of reconstructing the complex lifeways and dynamics of social change in this region through time. As part of this project the team of Michael Kolb (pers. comm. 1 May 2001) has recovered a burial chamber in which at least 3 primary interments have been identified, and secondary burials (at least 6 adults) define what Kolb described as the "corporate burial".

At La Grotta del Cozzo Palombara (Carini) excavators recovered "*diversi frammenti di ossa umane e due molari*" among remains of the EBA Rodi-Tindari-Vallelunga culture (Mannino and Giambona 1994: 59). Mannino and Giambona note that this culture is not well known on Sicily, but that it appears to parallel the Castelluccio culture. Materials of the MBA and Final Bronze Age also were recovered in this excavation, but whether human remains were also in these later aspects is not likely. No report has been noted on the EBA human remains from La Grotta del Cozzo Palombara.

A brief note on the three EBA skulls from the necropolis at Monte Racello and Monte Tabuto at Comiso (Ragusa) is included within the report of Passarello and Alciati (1969a: 84). Other small collections of human remains from EBA sites now are located in the collections at the Museo Regionale di Archeologia in Palermo and each of these merits a study. In addition, there now are in Rome a number of skulls recovered from the Grotta Chiusilla near Isnello (Cefalù). Vecchi (1969) dates these skulls now located in Rome to the EBA, and uses the data from them in his study of discontinuous cranial characteristics. However, Ruth Whitehouse (pers. comm.) points out that these skulls may derive from the same Copper Age context discussed previously (also see Sergi 1891, 1895a; Giuffrida 1901-02, 1903). The Copper Age - EBA site of Villafrati in northwestern Sicily has also provided some skeletal material of note (Zuckerkandl 1877).

Procelli's (1981: 95) report on the two tombs from the Contrada di Paolina (also Ponte di Paolina), located between Ragusa and Santa Croce Camerina in southeastern Sicily, indicates that the more intact of these tombs had held the bones of approximately 50 people. Procelli (1981) compared the archaeological data from these tombs with those of approximately the same date on Malta. The principals in this tomb, or the last individuals to have been buried there, were found near the entry, with the bones of previous arrivals shifted to the rear.

Procelli (1981: 107) turned to Doro Garetto for the evaluation of the skeletons that he recovered from Contrada di Paolina. Procelli also notes that Orsi had found as many as 250 to 300 individuals in similar tombs at Canicarao, Ragusa (Orsi 1923, in Procelli 1981: 96, 107 n.11). Human skeletons from another group of rock-cut tombs found at Contrada di Paolina have been studied by Del Negro et al. (1987). They also include a bibliography of Bronze Age skeletal studies. Also of interest is the reported example of osteomyelitis seen in one of the skeletons from these tombs at Ponte della Paolina (Doro Garetto, Fulcheri and Rabino 1986). The manuscript from a more recent study (Doro Garetto et al. 1995) is now in circulation.

The fragments of 13 skulls, of which at least three are subadults, were found at the Grotta Maniace near Etna (Pardini 1976). These now are dated to the EBA. The few post-cranial remains noted by Pardini in this report suggest that little attention was paid to the recovery of non-cranial elements, a problem typical of even the best excavations of that period.

A dental study using populations from eastern Sicily of the Early Bronze Age (Bresci et al. 1987) is one of the few to focus on this important aspect of skeletons from Sicily. Since dental material preserves better than bone, the potential for gathering information from teeth often exceeds the limits imposed by searches for relatively intact skeletal remains. The Bresci team offers data essential to dental research that will be conducted in the future, and possibly for resolving questions of culture contact at this early date (see Procelli 1981). The question has been addressed more recently in a new non-metric dental study (Girotti et al. Ms. A), but the results do not appear to be particularly revealing.

The survey of Sicilian Copper Age and Bronze Age dental traits (non-metric) made by Vargiu et al. (1997) also includes data from five Copper Age populations from the mainland and two Bronze Age peninsular groups. A third Bronze Age population in their study is from the Ponte della Paolina material. Of note is their finding that all three Bronze Age groups form a cluster distinct from the five Copper Age populations, but the Bronze Age groups from Puglia and Sicily are closer together than either of them is to the Ligurian sample. These results should be compared with those of Girotti et al. (Ms. A), who also made use of the Ponte della Paolina population.

The limited human skeletal material from Contrada Menta (Milena, Caltanissetta) may date from the final phase of the Early Bronze Age (Palio 1994). The sparse remains recovered from Contrada Menta have been studied by Mallegni, Bartoli and Ronco (1994) using standard macroscopic methods. Recently, human skeletons from the burial area of the Grotta Ticchiara and from Sant'Angelo Muxaro in the region of Agrigento, dating from the EBA and also the LBA (see below), have been subjected to molecular studies to determine sex (Casalotti et al. 2000). In the absence of control studies using archaeological and/or anatomical data the results of this program remain uncertain.

Middle Bronze Age (MBA): ca. 1500/1475 - ca. 1250 BCE

The best known cultures of the MBA in Sicily are the Thapsos culture that succeeded the EBA Castelluccio culture on the eastern part of the island, and the Milazzese culture that followed the EBA Capo Graziano culture in the Aeolian islands (see Leighton 1993b, cf. Castellana 2000: 212-237). The MBA cultures are effectively reviewed by S. Tusa (1994: 106-107, 1996b; see also Leighton 1996b). Leighton (1996c) suggests that the Thapsos-Pantalica North period may extend over the 14th to the 11th centuries BCE, and be followed by the Ausonian II-III and Cassibile periods (10th-8th centuries BCE). Bietti Sestieri (1998: 33) links the Proto-Villanovan necropolis at Milazzo with the earliest phase of the Pantalica culture, which in turn may be linked with the Submycenaean and Protogeometric periods in Attica. Linking these "cultures" from widely spaced areas is less difficult than assigning specific chronological ties.

The extent of trade during the MBA, like biological contact, remains difficult to evaluate. "Mycenaean" contacts during the 14th to 13th centuries BCE are the subject of several important papers in a recent volume honoring Georges Vallet (École 1999). At present names that are descriptive of "cultures" are rarely used by physical anthropologists working on Sicily, where their primary concern remains the effective recovery and curation of human skeletal remains for analysis.

A brief interpretive overview of the anthropological data relating to the Middle Bronze Age, using the available skeletal remains, has been made by Borgonini Tarli et al. (1991-92). She notes the pressing need to collect more skeletal data and to conduct careful studies to expand on these significant points. Sergi (1893, 1899) offers some interesting skeletal data from skulls recovered from Cozzo del Pantano, a site that may

have its earliest occupation in the MBA and continued in use into the LBA. Among the human skulls curated at Rome are a number recovered by Orsi (1890, 1891a, 1891b) during his work at this site and at Plemmyrion, another Thapsos culture site. Vecchi's (1969) review assigned both Cozzo del Pantano and Plemmyrion to the LBA, but the evidence strongly suggests that they should be identified as MBA in date.

Excavations in Chamber Tomb C at the Contrada Marcita near Stretto, some 3 km. from Castelvetrano in the Province of Trapani (see Tusa 1996a, 1997), revealed what the authors of the skeletal report describe as an ossuary-like situation. The context is dated to 15-13th centuries BCE, or at the end of the Early and into the Middle Bronze Age. Tombs A and B from the Contrada Marcita appear to be Early Bronze Age in date, but no significant human remains were reported. Tomb C, with a MNI of 97, may provide the best collection of well preserved human skeletal remains from any prehistoric site on Sicily. Only preliminary reports are now available (Di Salvo and Tusa 1987, 1990; Di Salvo 1991, 1994b: 228-229, 1997). Full measurements from the remains from Contrada Marcita should appear in the publication of the complete study.

The most focused study of the Contrada Marcita human remains now available (Di Salvo 1991) provides some idea regarding the extent and condition of the materials recovered. Portions of 97 mandibles were identified from Tomb C, with cranial remains from 70 individuals. Craniometric data from the skulls of 17 males and nine females are noted by Di Salvo and Germanà (1997: 603). These remains should provide an outstanding basis for comparing various other Sicilian populations in time and space, and may even be sufficiently large to show micro-evolutionary changes at Marcita between the long periods of the Early and of the Middle Bronze Ages. Some contemporary MBA fragmentary skeletal material has been studied from Ulina (Becker 1997a). Tusa (1992: 472) notes the recovery of three MBA skulls from the Necropoli di Massolivieri at Siracusa (Sergi 1891), but Di Salvo and Germanà (1997: 603) report on the presence of only two skulls. These several small collections are of archaeological interestand the small numbers of skulls recovered provide some potential for comparison with data from Contrada Marcita.

An interesting example of possible enchytrismos burials, dated to the Middle Bronze Age, was found by Scibona (1971) in the northern suburbs of Messina. These two pithos burials appear to have held adult inhumations, but the disposition of these bones remains unclear and the provisional evaluations provided by the excavators have not been confirmed through skeletal analysis. For the chronological dating of importance in locating the periods associated with the skeletal remains found at the opposite (western) end of the island we have a useful review of the archaeological history of the upper and middle Belice River valley (Spatafora 1996). Spatafora's paper offers important background information covering the period from the MBA into the Archaic era that is now notable for the numbers of sites being excavated.

The human remains from a MBA site near Agrigento are among the first to be the focus of modern molecular analysis (Martínez-Labarga et al. 2000). Together with the study of the EBA and LBA materials that also came from the Grotta Ticchiara and Sant'Angelo Muxara near Agrigento, noted above, this approach to human remains represents pioneering efforts in a research methodology that is rapidly expanding in its applications (see below under DNA studies).

Late and Final Bronze Age (LBA, FBA): Ca. 1250 - ca. 1,000 BCE.

The central position of Sicily within the Mediterranean Sea places it in a pivotal position for maritime trade. Even before shipping became a significant factor in moving goods, probably during the LBA, trade and social relationships between the peoples living on Sicily and those in peninsular Italy were considerable. Although the majority of trade goods involved in these interactions must have been foodstuffs and other perishable commodities, the effects of trade and other contacts, even at this early date, must have been considerable. The archaeologically documented remains are substantial.

The implications of this trade for cultural processes throughout the region, were identified as of particular importance more than 25 years ago (Bietti Sestieri 1976, 1979, 1980). Continuing research efforts have refined the dates and the nature of these various contacts, while at the same time extending and focusing concerns relating early trade to other cultural processes. By the LBA the extent and variety of trade goods coming to Sicily from the eastern Mediterranean had grown enormously. Variations can be seen in the size and organization of individual village sites of the LBA, changes in population levels and regional densities, political and ceremonial processes, and different aspects of economic specialization. Each of these aspects of LBA culture history can be addressed through the expanding database derived from excavations of sites dating from this period.

Tusa suggests a beginning date of after 1250 BCE for the LBA/FBA (1994: 107-108; see also Leighton 1996a; cf. Whitehouse 1994: 91-94). While the funerary customs of Late Bronze Age Sicily are well known (e.g. Maniscalco 1986), skeletal remains dating from this important period are rare and infrequently evaluated, for a variety of reasons. Among these reasons is the observation that the rock-cut chamber tombs, still in use during the LBA and FBA, frequently were converted to other functions by later populations. E. Blake (2001, In process A) believes that many of the old tombs at Pantalica (see below) were cleared of bone as well as other contents by renovations made during the Byzantine period, if not before. Such ancient clearing of tombs may have eliminated some of the bone from the LBA burial noted by M. J. Kolb as being in the Monte Polizzo area near Mokarta, where he had also located (see above) a Copper-EBA grave (De Angelis 2001: 197).

Excavations at the LBA necropolis at Dessueri at Monte Canalotti near Gela (Caltanisetta) during the period 1991-93 (see Panvini 1993-94) have been assigned a LBA date by Tusa (1992: 611). This would place them in the Pantalica culture. The Dessueri excavations produced a small collection of human skeletal remains that were soon studied by Di Salvo (1996; cf. Passarello et al. 1969). These bones appear to be from, or identical with, the collection of 21 skulls and other skeletal material said to be from the same LBA site at Monte Canalotti and that was also studied by Di Salvo (Ms. A).

Skeletons recovered from excavations at Monte Rossomanno, near Enna (Fiorentini 1980) are believed to derive from a mixed population, biologically descended from the earliest Greek traders, or possibly early colonists and members of the indigenous population, but no osteological investigation has been attempted to examine this question. The extensive Late Bronze Age cemetery excavated by Prof. Giuseppe Voza at Villasmundo produced an impressive range of artifacts. Voza, however, saved no human skeletal remains from his excavations at this site even after my personal request that he collect bones during future work. I had also promised to study human remains that he might care to recover.

A wealthy LBA tomb discovered at Contrada Capreria in Agrigento Province, near Sant'Angelo Muxaro, has been noted by De Angelis (2001: 182). The Contrada Capreria tomb, dated to the second half of the 12th century BCE, held the remains of two people; a child under age 10 and an adult said to be 20 to 25 years of age at death. Anthropological confirmation of a limited nature was derived from Castellana (2000).

A single LBA skull (female, age 30-35) from Timpone Pontillo in the area of Santa Ninfa (TR) was studied by Becker (1985: 213-214, passim; see also Mannino 1974). The long list of metric data from this single example was published along with similar data from a number of skulls of a later period from Mozia to provide a test of comparative methodologies. Prof. Lyle W. Konigsberg (pers. com. 10 Nov. 1989) utilized these metric data, selecting only a subset of seven from the categories provided, to conduct a Mahalanobis distance analysis. He selected "these 7 traits on the basis of a within-group principal components analysis of the Mozia collection." Konigsberg indicates that the results indicate that this indigenous female from Santa Ninfa could be easily differentiated from the females at the Phoenicio-Punic colony

of Mozia, whose origins are not yet clearly confirmed as being of an immigrant line or from a mixed Punic-native genetic structure (see below).

Vecchi's (1969) incorporation of cranial data from skulls recovered at Pantalica, and now stored in Rome, identifies them with the "third" phase of the Bronze Age (see Orsi 1890, 1899). This period now is regarded as within the Late-to-Final Bronze Age. The extensive Pantalica culture necropolis in southeastern Sicily that is dated to the LBA and into the Iron Age includes several thousand tombs (see Leighton 1999: cover). Blake (2001, In process A) notes that the Pantalica cemetery provides the most dramatic example of a widespread Byzantine era reuse of the rock-cut tomb chambers. However, she points out that at least one example at Pantalica appears to include surviving bones, placed in a niche, possibly reflecting an original LBA deposition. Blake also points out that Orsi (1899: 58) had earlier suggested that the prehistoric skeletons at Pantalica were still in place until cleared by Byzantine excavators.

A number of tombs of the Final Bronze Age were excavated from along the Dirillo River in southeast Sicily (Pelagatti and Voza 1973: 26; 1974: 35-38. Skeletal remains recovered from these tombs, if any were saved, have never been evaluated. The dating of these materials also is of importance in establishing the time of transition to the Iron Age, and to evaluating archaeological characteristics involved in this process.

The distinctions between the Late and Final Bronze Age as well as between the various proposed aspects of the Iron Age continue to pose difficulties for archaeologists working in Sicily. Thus the site of Sant'Angelo Muxaro near Agrigento, with its rich inventory of Geometric period pottery (Fatta 1983), continues to be difficult to place in time. While aspects of this site appear to derive from the EIA, dates as early as LBA and as late as the *seconda età del ferro* continue to be associated by various authors with this site. Adding to the confusion is the inclusion in a volume on the Middle Bronze Age (Castellana 2000) of Mallegni's (2000) note on a mandible from a tomb at Contrada Capreria near Sant'Angelo Muxaro. Mallegni's note may not refer to the apparently sub-adult mandible that is illustrated. Mallegni's paper (2000) is followed by a DNA study (Martínez-Labarga et al. 2000) that uses bone samples from the EBA Grotta di Ticchiara (N=4), and from the nearby Sant'Angelo Muxaro (N=1) that may date anywhere from the LBA to the Iron Age or later. Both of these papers raise questions regarding chronology as well as archaeological contexts.

Early Iron Age: Ca. 1,000 to ca. 800 BCE
[also included with the "Archaic period" in some of the earlier literature]

The term "Età del Ferro" in Sicily generally is applied to that period after ca. 900 BCE, and lasts into the time of Greek and Phoenician commerce and colonization on the island. Selection, however, of an earlier beginning date of ca. 1000 BCE brings the chronology into alignment with the general Mediterranean pattern. In many accounts the Iron Age is referred to as the "Archaic" period, but the term "Archaic" also is used to describe contexts as late as the 7th to 6th centuries BCE (see Tusa 1994: 107-108). Leighton (1999: 187) distinguishes an Early Iron Age (EIA) period that he dates to ca. 900-734 BCE, ending at the supposed time of the first Greek settlement made in eastern Sicily. Leighton separates his EIA from the initial period of Greek colonization, or the period from 734 to 650 BCE, sometimes identified as the *seconda età del ferro*, or what may be identified as the Proto-Corinthian ceramic period. Note should be made that Leighton (2000) points out that the usual dating of the Cassibile – Pantalica II Phase is about 1000-850 BCE. Leighton suggests, however, that 925-750 BCE would be more accurate (see also De Angelis 2001: 153). As noted earlier, physical anthropologists generally try to avoid these terminological problems relating to chronologies when working on the bones from a single site. More commonly they seek relatively firm dates secured through 14C analysis. However, when attempting comparative studies of skeletal remains, these archaeological problems become central to interpretations of processes of biological change.

At Morgantina a number of Iron Age burials have been identified (Leighton 1996a, also Leighton 1996b). Morgantina is believed to have begun as a native village strongly

influenced by Greek colonies on the coast. The few human skeletons recovered from these tombs have recently been re-evaluated (Becker 1998a, cf. Becker 1998c). The cultural identity of these people is not yet evident from these limited skeletal studies, but Lyons (1996b) describes this population as Sikel. Prof. Carla Antonaccio now is concerned with the decoding of these complex relationships among the various native and colonial populations at Morgantina. Her efforts will be important to future skeletal studies and to the structuring research questions that take into account the human remains.

Of particular note relating to studies of immigrant and native populations are Nagel's views (1945, 1953, 1973, 1977) that Neolithic period Greek groups were of critical importance to understanding Greek skeletal populations dating from the classical period. His early ideas must be borne in mind as we seek to understand the native populations on Sicily and try to contradistinguish them from colonizing or immigrating Greeks. These questions more commonly are directed toward Sicilian populations from after 800 BCE (see below), but earlier contacts were extensive and probably extremely important to the biological history of the island.

Drago (1958-59) also notes that the Necropolis of Santa Margherita at the Contrada Crucara (or Brucara) at Monte Cronio, found by accident in 1910, dates to the Early Iron Age. The presence of cremations from Sicilian sites of this period is rarely noted in early excavation reports. The first cremations in this region were clearly noted by Barocelli (1943: 126-127).

Drago's (1958-59: 215) report focuses on the excavations at Monte Cronio (Agrigento), which is near Menfi between the mountains called Ribera and Menfi and the rivers Verdura and Belice. Drago is one of the few to mention the presence of what seems to be a cremation necropolis, filled with "ceneri e i frammenti di ossa bruciati."

Cremations were rarely recovered or curated in Sicily until recently, and the analysis of cremated skeletons was even less frequent (cf. Griffo 1942). The lack of awareness of how much data can be recovered from these burned remains was common throughout the Mediterranean until recently. Fortunately cremated remains from the *tophet* at Mozia (see below) have been conserved and studied, and cremations from other sites are increasingly being recognized in their contexts and reviewed (see Bondioli et al. 1994, Cattaneo et al. 1994, Becker 1995a).

Excavators at Monte Castellazzo di Poggioreale in the Belice Valley (see Falsone 1990) recovered some traces of human bones in various contexts not associated with an identified cemetery (Becker 1998c). The brief report on the finds of bones from Monte Castellazzo provides some indication of related cultural activities at this site during the Iron Age in southwestern Sicily (cf. De Angelis 2001: 194). From the Leontini necropolis at Piscitello in northern Sicily (Frasca 1982) there is some limited information on the skeletal remains, but details of their condition remain unknown. Human skeletal material from several other sites of the "Iron Age" has been examined, but the total database from this period is not particularly large considering the proliferation of immigrant cultures that marks this period (see Frasca 1996). The 18 supposedly "Archaic" period human skeletons from Imera Pestavecchia (Fabbri and Carnieri 1997) remain to be evaluated.

Facchini and Brasili (1979) note an Iron Age ("*età classica*") skeletal component from among the human remains recovered at Castiglione, dated to the 7th to 6th centuries (700-500) BCE. Martuzzi Veronese (1978) reports on remains from Sperlinga (Ragusa) that she places in the 6th century BCE. Sergi's (1898) report on Archaic Greek materials from the Fusco necropolis at Siracusa has been expanded by Passarello and Alciati (1969), but both of these reports remain to be expanded. Resolution of the question regarding dates is essential to appropriate chronological placement of these sets of skeletal data.

Protohistoric period: Ca. 800 – ca. 730 BCE
(also commonly identified as the "Archaic Period" or with the later "Iron Age")

Over the past two decades much has been clarified regarding the considerable extent of Greek influence in Sicily and southern Italy before the first "colonizing"

efforts began in the 8th century BCE. Lo Schiavo (1982) presents evidence from the Bronze Age, and together with E. Macnamara and L. Vagnetti (pers. comm.) are assembling data for Mycenaean contacts. The extent of contact between various parts of Greece and the areas of Italy that were later colonized was extensive before the Iron Age began. A gradual change in native cultures long has been well documented in Puglia from the 14th century BCE, and continuing up to the Roman conquest of that region (D'Andria 1983, Yntema 1982).

Greek colonization, perhaps in the form of permanent trading stations, certainly had begun by the mid-8th century BCE, at least 20 years prior to the supposed "historical" date of the first colony (cf. Becker 1999c). Almost certainly early Phoenician trading outposts also had been established in Sicily by 750 BCE, but the process of differentiating between a trading station and a colony remains an archaeological task to be resolved. The later colonial relationships between Greeks and natives on Sicily, as in south-eastern Italy, must be understood in light of archaeological considerations recently clarified by Whitehouse and Wilkins (1989; see also Barra Bagnasco et al. 1999). Sammartano (1998) offers an exhaustive review of the considerable literary evidence regarding native cultures on Sicily, and the complex relationships and social dynamics that took place after Greek and Punic colonial ventures began to multiply. These texts, however, long postdate the actual events and need to be reviewed from the perspective of folklore and legend. The nature of these early contacts and relationships are critical to the formulation of models by which to direct skeletal studies and to the interpretation of the results (see Shepherd 1995).

Whitehouse and Wilkins (1989) correctly indicate that ca. 750 BC the Greeks were not a fully urbanized population, and that much of their urban development in southeastern Italy took place in parallel with that of the native populations (cf. De Angelis 2002). Whitehouse and Wilkins point out, and review, two preconceptions that need to be clarified in order to effectively evaluate the relative archaeological evidence. The first of these preconceptions derives from the uncritical acceptance of the accuracy of Greek and Roman texts and the consequent reliance on these texts by some scholars to "interpret" archaeological findings. Excavators accepting these texts as valid often fail to give proper credence to direct archaeological evidence. Today it is essential that scholars also provide critical analysis of these documents in order to understand just how limited they are in helping to decode the vast and complex archaeological record. Second, assumptions that the cultural behaviors of the Greeks were generally superior to those of the natives, consistently distort interpretations of the data from sites of both cultures (see De Angelis 1998 for a case study). By focussing on the archaeological evidence in their discussion, Whitehouse and Wilkins (1989) free us from many of the perceptual errors that have colored previous interpretations of the data. These problems had influenced our views of Sicilian archaeological studies and thus became important in the analysis of the skeletal remains. The same considerations reviewed by Whitehouse and Wilkins need to be applied to the interpretation of the newly emerging skeletal evidence.

Much of the skeletal information now available from the Protohistoric period, such as the data from Entella (Becker 1986, 1993), reflects the fragmentary condition of the materials collected from the various excavations at sites of this era. Yet an overview study of human remains focusing on the Greek colonies, which also to includes human remains from the entire period from the 2nd millenium BCE (Thapsos and Plemmyrion, see above) to the 3rd century BCE (Siracusa B), suggests that some sites have excellent preservation. Rubini et al. (1999) purportedly surveyed some 488 crania from eastern Sicily in various collections, but provide no specific listing of these skulls. My attempts to identify the specific skeletal collections in which these remains are said by the authors to be curated have not been successful.

Although we know a great deal about the Phoenician colonization of Sicily (Aubet 1993), few of the numerous studies of Phoenician skeletal materials from the 9th/8th and 7th centuries BCE include anthropological data useful in comparative studies

(e.g. Becker 1990, Ms. F, cf. Benichou 1982). Passarello (1974) includes a reference to cremations from Mozia of an early date in his survey, but provides no analytical details and is unclear as to whether or not these "cremations" are the bones of adults or children. Ciasca et al. (1996) give the important remains of the infants from the tophet at Mozia some of the attention that they merit (see below). As studies of the settlement area at Mozia expand (Famà 1993/94), concern with interpreting the skeletal evidence has also expanded. Both of these subjects for research are concerne with the daily lives of all classes of people at Mozia, as well as with their interactions with the natives on mainland Sicily.

The site of Butera, one of the many known protohistoric period locations on Sicily, was extensively excavated by Adamesteanu (1958). Guzzone (1985-86: 9, 17) points out that of the 164 or more tombs that were "recovered" from Butera, many were cremations and others were believed to be infant burials identified as Greek *enchytrismos* (Adamesteanu 1958: cols. 285-463). Guzzone (1985-86: 16) discusses Greek parallels for these burials, but carefully notes that the absence of a skeletal evaluation (p. 32) seriously restricts our ability to interpret the significance of the tomb goods (cf. Pelagatti 1976). Shepherd's (1993, In press A) observations regarding graves at Siracusa are relevant, and are noted below (see also Becker Ms. D). Both cremations and "sub-floor" infant burials require careful osteological attention to confirm the interpretations provided by the excavators (cf. Becker 1997c).

Guzzone (1958: 11-12) lists a number of supposed cremations from Butera, but each of these evaluations of burned bones is suspect. In addition, a supposedly "headless youth" in one of these graves (Guzzone 1958: 12, 15) is an interpretation that warrants careful attention. Of importance is Guzzone's (1958: 29) suggestion regarding the presence of family groups in this cemetery. Guzzone's suggestion was a pioneering effort to make sense out of the mortuary pattern by studying the pattern of the groupings of these graves and not simply listing the tomb goods specific to each burial. Guzzone's comments precede by some 30 years the groundbreaking work of Bietti Sestieri (1992a, 1992b) at Iron Age Osteria dell'Osa, the ancient village of Gabii near Rome. Bietti Sestieri was able to demonstrate the clustering of family burial groups and the distribution of these clusters within the cemetery. The evidence derives from her brilliant and careful excavations coupled with her use of the human skeletal analysis that she directed (Becker and Salvadei 1992) in order to have specific age and sex data for every individual recovered.

Pelagatti's (1976-77: 527-530) work during the years 1966-73 at Monte Casasia, on the river Dirillo north of Ragusa, produced a sample of at least 133 and possibly as many as 149 individuals based on a count of the long bones (Facchini and Brasili Gualandi 1980: 255-256). Crania from only 86 adults are noted (41 M, 15 F, 30?). No sub-adults or children are mentioned from any contexts. Facchini and Brasili Gualandi (1980: 269-270) present lists of data on adult statures using three sets of regression formulae; those of Pearson, Manouvrier, and of Trotter and Gleser. As has been demonstrated elsewhere, the results generated from the use of these three different systems, respectively, produce relatively low estimates of stature, medium results, and high statures (cf. Becker 1999a). Recent publication of 31 tombs from the native necropolis at Monte Casasia (Pelagatti and Frasca 1996) provides data from the 7th through 5th centuries BCE, but no skeletons are mentioned nor is any note made regarding the relationship between the 31 tombs and the data summarized above.

The human remains recovered from Monte Casasia may represent people related to the inhabitants of the Siracusan colony of Casmene (see Pelagatti and Voza 1973: 129; also Fiorentini 1977, 1978). The 7th-6th centuries BCE population from the necropolis of Castiglione, also in the Ragusa area, has been published by Facchini and Brasili Gualandi (1979), who use the term "*età arcaica*" to identify its chronological position. Some very limited skeletal material has been recovered from the 90 tombs of the Archaic necropolis at Morgantina (8th-4th centuries: Lyons 1996a, 1996b, see also Antonaccio 1997; Leighton 1993, 1996a). These bits of curated human skeletons have been studied recently, providing some metric data along with age and sex

evaluations (Becker 1996b). Antonaccio's (2001) careful evaluation of the ceramics from Morgantina provides important evidence in support of her conclusion that this settlement represents a city of indigenous Sikels who had occupied this site since it was an EBA village (see also Lyons 1996). Thus we should expect the very limited skeletal evidence preserved from earlier excavations at Morgantina to reflect the remains of the native population rather than the direct descendants of Greek immigrants (cf. Coldstream 1993). Parallel skeletal data from the 6th century BCE at Sperlinga (Ragusa; also see above) is offered by Martuzzi Veronesi (1978), and a late 6th century BC necropolis from Siracusa also has been studied (Becker Ms. C; cf. Mauceri 1877).

Some limited comparative skeletal data from the Naxos "colony," including inhumations (N=2) and cremations (N=3), plus extensive data on paleopathologies has been published by Doro Garetto (1984; also see Procelli 1981, who defines the materials that he recovered as being from the EBA). Doro Garetto (1980-81) also offers good metric data from a single adult female of the 8th century BCE at Naxos, plus a bit of information from the bones of a perinatal and an infant of 18 months.

Late Iron Age (Protocorinthian Ceramic Period): ca. 730-625 BCE

The problem of evaluating "culture" on the basis of specific forms of artifacts has long plagued archaeologists excavating Sicilian sites. The *tomb* goods from many sites on the island "suggest" the presence of Greek colonists, or possibly extensive trade with them. Only now are some of the sites that were once identified as Greek "daughter" colonies being recognized as villages and cities of the native Sicilians who had adopted or imported significant quantities of Greek ceramics and other products (cf. Lomas 1996). Archaeologists might note that if artifacts alone reflected population movement we would have to rewrite the known history of America. The artifactual evidence indicates that after 1950 America had been almost completely repopulated by Japanese and Chinese, as the artifacts from these two countries alone dominate the material culture of the USA during the last half of the 20th century. This archaeological evidence is abundantly available through excavation of trash heaps that accumulated throughout America.

The relatively precise dating of Sicilian graves of the Late Iron Age (LIA) is made possible through evaluation of these ceramic offerings, and the chronological ties of these grave goods with other ceramic sequences developed throughout the Mediterranean. Identification of the LIA with the Protocorinthian ceramic period derives from finds of the dominant ceramic forms in vogue as reflected in the chronologies established by ceramic specialists. Thus reference to the "Protocorinthian Period" focuses on specific ceramic types, with the implication that identified changes in pottery forms and decorations strongly reflect processes of culture change.

The Fusco necropolis has yielded graves dating from just after formal Greek colonization supposedly began. Other burial areas in the vicinity yield graves from all periods extending up into the Late Roman era (see De Angelis 2001: 162-164). These Greek colonists may have been as concerned about their membership in a particular "polis" as the homeland peoples were in maintaining their traditional identities. Among the Greeks laws were passed and plays were written to deal with various problems relating to culture change. These problems included the question of citizenship for children of slaves and of any "others" associated in different ways with a specific city. These questions were a matter of considerable social concern to these ancient Greeks throughout the colonial world, and a relatively low degree of genetic mixing with local populations might be expected. Our questions at the moment include one relating to the identification of these individuals of mixed descent, if that is even possible.

Frederiksen (1999: 229) focuses his research on those grave goods from Fusco dating from the Protocorinthian [ceramic] period. As just noted, relating this ceramic sequence to other chronologies is generally considered to be a reliable technique for establishing dates as loci as specific as the level of individual graves. Had the skeletal materials from the graves in the Fusco necropolis at Siracusa been as carefully recovered

and curated as the metal and ceramic objects, we would now have a vastly better understanding of cultural dynamics at that site. Shepherd's (1993) important study of post-625 BCE artifacts from the Fusco necropolis provides a new view of these important data from the area of Siracusa, as will be noted in the following section.

The 7th-6th Centuries BCE (700-500 BCE), and the Greek Colonies

By the end of those centuries of activity often refered to as "protohistoric" (ca. 800-600 BCE), the Greek and Carthaginian colonies on Sicily had become well established urban centers of rather large size. The archaeology of the eastern half of Sicily during this Late Prehistoric and Early Historic periods has been brilliantly summarized (Bietti Sestieri et al. 1995). The skeletal remains that have been recovered need to be better integrated into this database. Unfortunately, the cemeteries associated with these extensive settlements have long been "mined" for artifacts, with little or no attention paid to the recovery of the human skeletons. For example, the extensive work conducted from 1925 to 1930 by P. Orsi and A. De Agostino at the possibly mixed Greek and indigenous city at Enna, in Agrigento, did not include the recovery of human skeletal remains. Nearly 50 years later the series of excavations at Enna that began in 1979 were similarly unconcerned with the skeletal evidence from this important site (De Miro and Fiorentini 1980: 134). Despite the discovery of a fascinating discovery of a huge deposit of human crania at Località Rossomanno at Enna (De Miro and Fiorentini 1980: 135, fig. 27), no attempt appears to have been made to recover and preserve these human bones.

The extensive work of Georges Vallet, who died in 1994, and his detailed publications of his many excavations over the years at Megara Hyblaea (see De Angelis 2002 for a review) did not include any research with human skeletons. Thus the consistent use of these data in the study of "Greek" urbanism and the differences between rural settlements (*chora*) and urban (*polis*) cannot be examined through the possible effects of those processes on the biology of these populations in transition. The skeletal biology of these peoples was not a concern of Vallet, nor of the contributors to a memorial conference (École Française 1999). Thus a intimately related area of study involving biological effects of transitions from foraging to agriculture, as well as rural to urban, follows a parallel course that would be usefully applied in answering questions these archaeological contexts.

The dearth of human remains recovered from sites of the 7th to 6th centuries BCE, or lack of intertest in them, led archaeologists to focus on the artifactual materials as a means by which gender could be linked with tomb use. Shepherd (In press A) has extended this traditional approach with an evaluation of the presence of "indigenous" individuals within primarily Greek colonial cemeteries in eastern Sicily. How these people are identified as "indigenous" in the absence of biological data presents an interesting exercise.

Throughout the Greek-influenced areas of Sicily there were numbers of Iron Age communities of native Sikels (Siculi) that have been excavated in recent years. Guzzone (1985-86: note 8) lists some of these many sites dating from the Iron Age, and also from later periods, at which the material evidence recovered from the necropoleis reflects various levels of cultural interaction. What remains unknown is the ethnic and/or biological composition of these towns and cities because we lack the skeletal data that would provide a basis for evaluation of what we suspect would be increasing genetic admixture through time. The artifacts alone cannot resolve questions regarding the biological impact of the Greeks on the native population of Sicily. Even questions regarding "Elymian origins" remain largely in the realm of theory (De Angelis 2001: 149) due to the lack of use of biological evidence to resolve these questions.

Also of interest to physical anthropologists are the infrequent reports of the presence, during the 6th century BCE, of cremation burials at some locations in Sicily. Cremations generally are associated with the Italian Iron Age, and their apparent absence in Sicily prior to ca. 600 BCE merits some attention. Either Sicilian Iron Age cultures were significantly distinct from those on the peninsula to sustain distinct mortuary progams,

or excavators of Sicilian sites dating to the Iron Age have been seriously remiss in identifying and reporting the presence of cremations. We need not emphsize the problems of recovery and curation of this category of archaeological evidence. Cremations continued to be a prefered mortuary form in some cities and in some regions of peninsular Italy long after the end of the 8th century BCE, but comparable evidence from Sicily is vague. Fortunately Doro Garetto and Masali (1976, 1976-77) have led the way in cremation studies on Sicily by providing good data on the cremations contained within two amphorae of the 6th century BCE recovered from the Greek colonial necropolis area of Rifriscolaro at Kamarina. Their discovery of an adult male, an adult female, and a child of at least 10 years of age was an important example of what kinds of information can be recovered from cremated human skeletons (e.g. Becker 2001; see also Pelagatti and Voza 1974). Note should be made that Olga Rickards has begun an extensive programme of DNA studies using data from Sicily. Included in the Rickards research program are samples from inhumations at the Rifriscolaro necropolis as well as from sites on the mainland (Anonymus 1996: 1, see also Rickards and Martínez 1998). The recovery of DNA from cremations remains a somewhat more difficult task but is said to be part of this program.

Extensive work at Morgantina, resulting in some early reports (Allen 1970, 1972-73), proved to be erratic in the recovery of human skeletal remains (Allen 1976-77, De Miro and Fiorentini 1980: 134, 136-137, Leighton 1986). The few resulting studies of skeletons of this period at Morgantina also have been less than satisfactory (Becker 1996b, 1998a), reflecting the quality of the recovery and subsequent storage of these bones. Recent excavations at Siracusa (Guzzardi 1991) have produced an extensive series of skeletons relating to the earliest Greek colonists and their descendants (VI-IV centuries BCE). The excavators of the many large projects at the necropoleis of Siracusa (Polacco 1993) had systematically discarded all human bones. Some work was done on this Greek colonial population at Siracusa (Becker Ms. D). In 1991 the program of study of the people in the Greek settlement at Siracusa was to have been undertaken by dott. Mauro Rubini (Roma), but the present status of that research is unknown.

Recent excavations have been conducted in Siracusa, along the Via Panagia and into the Contrada Palazzo, a region partially explored by G. V. Gentili in the 1950s (Gentili 1961). This project revealed approximately 300 tombs dating to the period VI-IV centuries BCE. Only approximately 100 of these tombs were excavated (cf. Consolo Langher 1997). On the basis of tomb size, the type of covers used for various other examples of these tombs, and the tomb goods in general, Tomb G5 was said to be "*una persona di maggiore rilievo (un mercante?)*" (Guzzardi 1993-94: 1305). Becker (Ms. D) evaluates the poorly preserved bones in T. 5 of the Viale Santa Panagia zone of the cemetery as definitely those of a female, and her age at death was approximately 40 years. While the speculative evaluation of gender on the basis of tomb goods may have been incorrect, at least Guzzardi attempts to infer the status of the T. G5 individual. The identification of this person as being of higher status than the others in the area infers that status and tomb offerings are correlated (but, cf. Becker Ms. D). But what actually is going on here? This woman may simply have been the wonderful wife of a prosperous person, but whether a merchant is entirely speculative.

Of particular note regarding the age at death of the woman in T. 5 of the Viale Santa Panagia zone and others in this cemetery is Guzzardi's (1993-94: 1305) observation that few children appear in the Via Panagia-Contrada Palazzo cemetery. Guzzardi also points out that sub-adults appear to have been buried in a special area to the north (see T. 6, T. 6bis, etc.; cf. Orsi 1894: 123). This observation should be considered in light of Shepherd's findings from cemetery goods in this area (see below) as well as Becker's various osteological investigations (Ms. D; cf. Becker 1995d, 1997c). Guzzardi's preliminary archaeological observations provide an excellent data base and important inferences that may be confirmed through comparison with the osteological evidence (Becker Ms. D).

G. Shepherd (1993: 112-113) examines tomb goods in graves excavated in the 1890s from various zones of the Fusco necopolis at Siracusa, focusing on materials

from graves that can be dated to ca. 625-580 BCE. Note should be made that the chronology at Siracusa for the period of the VI-IV centuries BCE has been subdivided into two units of approximately equal length. Siracusa A spans the period from ca. 600 to ca. 450 BCE, with Siracusa B extending to ca. 300 BCE. According to this schema, Shepherd has examined materials from the very beginning of what is called the "Siracusa A" period.

Shepherd's focus (1993) in studying graves from the Fusco Necropolis is on the burials of the sub-adults. Much of her effort involves decoding "who" was in each grave using the artifactual data alone, since no skeletal material was retrieved. Shepherd compares the data from the artifacts from the Fusco necropolis with the somewhat vague data on skeletons from Corinth. Since no skeletons were recovered from the early Fusco excavations, Shepherd can only decode the data from those tomb goods that are published. Note should be made that distinguishing between supposed "cremations" and the inhumations of children is not as simple a task as it might seem to some excavators. However, it does appear that the percentage of *enchytrismos* burials differ in various parts of the site. If these are uniformly perinatal burials then this finding may reflect shifts in residential areas (house locations) rather than temporal variations in mortuary programs. Thus the reconstruction of even the most basic features of many of the mortuary programs at this site becomes particularly difficult due to the lack of skeletal material as well as the limited documentation recovered from an excavation of more than 100 years ago. For more recent excavations at the Contrada Fusco see Basile (1993-4). The disposition of the human skeletal materials recovered by Basile, if any, is not known.

Shepherd (1993: 114) also reviews data from the Giardino Spagna excavations near Siracusa, and from other excavations in that area including the interments found along the Viale Paolo Orsi. She concludes that the child graves are concentrated in the earlier burial areas, but that by the 6th century BCE children are virtually absent from adult cemeteries. Shepherd recognizes "that children were being disposed of in some other way, [that now is] archaeologically invisible." Guzzardi's comments on the placement of childrens' burials, noted above, should be considered again at this point.

No human skeletal material is known to have been recovered from the Greek necropolis of approximately the 6th to 5th centuries BCE at the Contrada Mosè, east of Agrigento (De Miro and Fiorentini 1980: 113). Of note here is that among the nine tombs (inhumations) and at least two cremations found at the Contrada Mosè appear to be two tombs (T.1 and T.2) that date from the 3rd century BCE. Published data on the enormous numbers of tombs of the 5th-4th centuries BCE excavated from Siracusa rarely even include note of the presence of human skeletons. At best some note is made of the tomb form, commonly made "*a cappuccina, terragne, e ad 'ustrina*'" (De Miro and Fiorentini 1980: 123).

Shepherd's (1993: 115) summary of Orsi's 1889 data from his work at 7th century BCE Megara Hyblaea uses the term *enchytrismos* to include two types of burial. She joins in this category the inhumations of adults who were placed within very large vessels as well as those burials of cremated individuals interred within vessels of any size (cf. Becker 1998b for data on the cemetery at Mozia that was destroyed in antiquity). Her interpretations of the data and comparisons between mortuary programs at Siracusa and Megara Hyblaea demonstrate what can be done to interpret these ancient tombs even when the human remains are not available and the original record keeping was rudimentary. With careful excavations and good recording, plus good analysis of the human remains, the results can be even more impressive (cf. Bietti Sestieri 1992).

Most of the excavators of Selinunte over the years have neglected to recover human skeletal remains. The human bones from this site during the important period of colonization are few in number. De Angelis (2001: 198) notes that any skeletal material that may have been recovered from the 1,268 graves in the Greek necropolis at Selinunte have not as yet been studied. Exactly what has become of the human remains from Selinunte has not yet been revealed. Di Salvo's several studies of the Manuzza-

Selinunte population (see below) complement the earlier osteological studies of the few Greek skeletal remains that were recovered from the colonial period at Selinunte (Di Salvo and Tusa 1984; cf. Becker Mss. D and E).

The human skeletal remains of the "Classic Period" necropolis at Passo Marinaro, that like the cemetery at Kamarina are dated to the 5th-4th centuries BCE and have been studied by Doro Garetto and Masali (1976-77). Doro Garetto and Masali provide only a brief note on the bones of the 700 individuals of all periods recovered from the various necropoleis at Kamarina (see also Pelagatti 1976).

Punic peoples of the 4th century BCE

The establishment of many early Phoenician outposts in western Sicily in the 8th and 7th centuries BCE (see Lukesh 2001) were, to some extent, parallel to the Greek colonization of the eastern parts of the sland. Despite the extent of these efforts, few of their early cemeteries are known and no skeletal remains can now be identified. This is unfortunate not only for the loss of information from this period, but also because studies of the peoples of Carthage (e.g. Schwarz and Dirkmat 1984) provide the basis for comparative studies.

The single skull from the area of Palazzuolo Acreide discussed by Nicolucci (1865, cf [1869?]) provides us with one of the earliest studies of the skeletal remains left by the Phoenicians on Sicily. The date of that skull, as well as the locations of copies of this publication, remains difficult to determine. While interest in the Phoenicians on Sicily remains strong (Tusa 1971, 1974, 1988), many of their largest cemetery sites on the island have long since been disturbed. Tusa (1985: 305-306) specifically focused on questions regarding the biological impact of the Phoenicio-Punic colonization. The limited archaeological data in association with the skeletal population recovered and preserved at Mozia provides little aid in working out a biological sequence. Some of the best preserved skeletal remains are curated at Mozia (Becker 1985), but the absence of good records inhibits the use of these biometric data.

Skeletons derived from suspected 4th century BCE contexts representing the Cathaginian colonial population at Mozia have been examined. However, in general the contexts for all of the individual skulls stored at Mozia are not good, and therefore specific dates are not certain (Becker 1985; also 1996c). Some of the skulls in this sample may derive from Hellenistic period tombs, but the possibility that some may date from the medieval period also has been suggested. A single tomb at Mozia that almost certainly dates from the IVth century BCE yielded but a few traces of human bone (Becker Ms. G).

At some point in time, probably soon after the establishment of the Punic colony on the small offshore island of Mozia (cf. Becker 2000c), the immigrant colonists expanded their settlement to include the nearby coastal area of Sicily. The coastal settlement at what became the ancient city of Lilybaeum continues to this day as the famous Marsala. Prof. M. Kolb reports (pers. comm. 1 May 2001) that two of his students are examining skeletal material from Marsala that represents approximately 50 individuals from a supposedly known context, possibly of the 4th century (cf. Becker 1995b). The dates for the tombs that Kolb has noted have yet to be established. The skeletal data from Marsala may be important for comparison with the subset of the Mozia craniometric data believed to relate to the Carthaginian colony as well as to other native populations from the area around Marsala.

A sample of a much later population recovered during excavations at Lilybaeum, has been dated to the period of the Roman dominance of the 4th century BCE to the 5th century CE (Di Stefano 1982, 1984, 1987, 1993b). These skeletons have been examined by Di Salvo (1984b, 1993b; also Becker 1995b), but a comprehensive study of the numerous skeletons from excavations at Lilybaeum remains to be undertaken (cf. De Angelis 2001: 196). Some indication of the extent of skeletal material that was present in the vast necropolis at Marsala is provided by Bechtold's tomb data (1989, 1993), but only a very small fraction of these remains were recovered for study (Becker 1995b; cf. Schwidetsky and Ramaswamy 1981). During the initial

phases of human skeletal research at Marsala (Becker 1995b) note was made during my direct observation at the site that vast quantities of intact human bone found in the hypogaeum tombs were being discarded onto the backdirt piles. Presumably this material was redeposited elsewhere without regard to possible recovery and curation.

The "Tophet" at Mozia

Both the human and the animal skeletal remains excavated some years ago from the *tophet* at Mozia recently were evaluated. Di Salvo examined the human remains in conjunction with an animal bone specialist and the excavator (Ciasca et al. 1996). They determined that the 718 urns and various other deposits from the area identified as the *tophet* each generally include some perinatal human remains, but that the remains of birds, sheep-goats, and various molluscs also are commonly present. These findings are similar to those from other "*tophets*" throughout the Mediterranean such as at Tharros on Sardinia, and also Sousse at Carthage. A great deal of work remains to be done to analyze these units at Mozia, but I suggest that this tophet, like others throughout the Punic world, served as a combination of childrens' cemetery (for perinatals) and as a zone for ritual offerings (cf. Becker 1995d, 1997c). The artifacts found among the various infant burials may be related to fertility offerings or petitions for reproductive success. I believe, as does Moscati (1987, 1988; see also Ciasca et al. 1986: 322, n.12), that the common belief that children were actually sacrificed is highly unlikely. Separate cemeteries for the remains of perinatals were and are quite common throughout the Mediterranean, with each culture having its own specific ideas regarding where to place the small bodies of these children. The decision is always relative to the cemetery for "adults". Therefore, perinatal mortuary programs may be an excellent means by which ethnic identity may be recognized through archaeology (cf. Becker 1997c).

The punic necropolis in Palermo

The extensive necropolis now beneath modern Palermo attests to the long and vital occupation of this area as a Punic colonial settlement. This cemetery has been explored in a number of excavations, but access to the burials is limited by the location. The burial area has been largely covered by a dense urban area of modern Palermo (Di Stefano 1993a, 1998b; see also Marotta et al. 1993: 287-294), with house foundations generally destroying or at least covering many of the graves. Fortunately an important part of this extensive cemetery lies beneath the Caserma Turköry and numbers of burials have thus become accessible in recent years.

Some of the data from the years of excavations at the Caserma Turköry have been summarized by De Angelis (2001: 185). He notes that the 1996-1997 excavations located 35 new tombs, which when added to 43 identified during previous seasons provides 78 contexts from which huge numbers of individuals have been identified. Inhumations, including children in stone sarcofagi, are noted separately from cremations. Some of the difficulties in the studies of the related human skeletons can be seen in the lack of a clear correspondance between the archaeological record and the skeletal lists. For example, recent excavations at the Caserma Turköry revealed an important Punic chamber tomb (T. 50) that Di Stefano notes was in use from the middle of the Vth to the end of the IVth centuries BCE. Within it were at least 13 burials (9 cremations, 3 inhumations and one *enchytrismos*).

While the number of individuals identified in this single tomb (T. 50) appears to me to be quite low for a chamber supposedly in use for more than a century, the skeletal report (Di Salvo 1998c) neither confirms nor negates the archaeologist's estimate. More extensive osteometric data is provided by Di Salvo (1998b) for the approximately 50 people (37 inhumations, 13 cremations) excavated from various other contexts within this part of the ancient necropolis found beneath the Caserma Turköry.

Comparative studies may be made with osteological data from the Caserma Turköry skeletal population and the data deriving from ca. 120 people (51 inhumations, 69 cremations) recovered from the Via Gitto excavation in Palermo. The Via Gitto

excavations have revealed another aspect of the huge Punic necropolis best known from the excavations at the Caserma Turköry (Di Salvo 1998a). Di Salvo (1998a: n.12-15) offers a few comparisons between the Via Gitto skeletons and the Caserma Tuköry data (Di Salvo 1998c), as well as with the Manuzzo-Selinunte data (Di Salvo 1987; see below), data from Carthage published by Mallegni et al. (1980), and from other possibly Punic sites. A serious study of these archaeological contexts as well as a re-evaluation of the osteometric data is warranted from this as well as Di Stefano's (1993a) earlier work at the Punic necropolis in Palermo. These several excavations have provided an important collection of skeletal remains that remains to be given extensive study and detailed publication (see Germanà and Di Salvo 1994).

4th-3rd centuries BCE

Extensive excavation at the supposedly Greek colonial settlement of Manuzza near Selinunte (Trapani) on the west coast of Sicily, has provided a significant skeletal population that can be dated to the 4th and 3rd centuries BCE. This is the period of Punic hegemony in the region of Selinunte and thus the biological data from this site during this period of time are of particular interest. Questions regarding possible biological influences of the Greeks and/or the Phoenicians on local populations during this period have been indirectly addressed in Fabbri's (in press A) dental survey. These matters can be considered in detail through review of the skeletal data now available in storage. Di Salvo has provided a number of skeletal reports specifically examining thre human remains from Manuzza-Selinunte of the 4th-3rd centuries BCE (Di Salvo 1987, also 1984a, 1984c, 1986, 1990). In particular, Di Salvo (1987) offers craniometric data plus a overabundance of attention to statural calculations on the 11 individuals chosen from her sample from this period at Manuzza. Since only seven of these 11 people are adults, the use of five different sets of formulae to calculate all the statures becomes even more interesting. In addition to the redundance of providing data using all three of the more commonly used sets of formulae (Trotter and Gleser, Manouvrier, and Pearson), Di Salvo purports to use formulae provided by Dupertuis and also by Haddon. The sources for these two latter sets of formulae are not cited. The data that are presented from the three more commonly used systems are presented in a random fashion. The three commonly used sets noted by Di Salvo have been noted elsewhere (see Becker 1999a) as producing statural calculations that range from relatively tall (Trotter and Gleser) to relatively short (Pearson). Of particular interest are the results of the calculations that Di Salvo states as derived from the two rarely noted systems. These two systems both, according to Di Salvo, yield statures even greater than those generated by the Trotter and Gleser system (cf. Becker 1999a).

Some useful work has been completed on human bones from Punic Tharros (now Tarro in Sardinia; Fedele 1979, 1983). This research also merits a program of comparative research. All of this material will provide interesting comparisons with Canaanite skeletal populations studied by Gonen (1992) and the Carthaginian data generated by Schwartz and Dirkmatt (1984; also Kilgore and Jurmain 1988, Sandford et al. 1988). Also of note is the work of Mallegni, Fornaciari and Bartoli (1980) on human skeletons from Punic Carthage, which is where Di Salvo (1983) turned for comparative data (rather than Tharros) that at the time was sparcely available from Sicilian punic populations.

Completely unknown is whether any Punic skeletons were recovered from Monte Luna (Costa 1983) or from any of many other sites of this period excavated within the past 15 years.

The Hellenistic period

Perhaps the most interesting aspect of studies of human remains from Hellenistic period contexts is the nearly complete absence of them. Even reports of burials dating from this period remain few in number. The interest in tombs from this period focuses almost entirely on the artifacts recovered.

Hellenistic period tombs were recovered from Necropolis A at Entella (Guglielmo 1988), a cemetery with graves that principally reflects the people of the Muslim period of occupation in this area (Nenci 1988). When first excavated in 1987 a total of 27 tombs were found that are all believed to be Muslim in origin (Fabbri 1988). Subsequently an additional 29 tombs were excavated (Fabbri 1990) of which 15 were Islamic in origin and the other 14 dated to the Hellenistic period. The 14 Hellenistic tombs noted by Fabbri (1990) should be considered in the context of the 4th to 3rd centuries BCE. Skeletal studies by di Salvo provide useful data from the Hellenistic period at Marsala (Di Salvo 1984a).

Roman to Roman Imperial period

As Roger Wilson (1990) points out in his opening chapter of *Sicily Under the Roman Empire*, the absence of published excavation data of any type, not only relating to human skeletal remains, from Greek and Roman sites on Sicily is remarkable. Detailed published studies of specific aspects of Roman rule, such as Belvedere's (1995) investigation of land tenure and settlement (also Belvedere 1998), are not matched by excavation or by skeletal reports. The Morgantina publications (e.g. Lyons 1996a) are helping to change this archaeological picture, but studies of the skeletal materials lag considerably behind the excavation data. Of note in this context is the observation that archaeological evidence for Christianity as well as Judaism are not documented in Sicily from before the 3rd century (Ramelli 1999). The lack of documented earlier sites is significant in understanding the chronology of events on the island, but it also may reflect the focus of excavations and the lack of general data from this period.

Skeletal studies by di Salvo noted above provide data from the Hellenistic period at Marsala (Di Salvo 1984a) as well as data from the Roman Imperial period (Di Salvo 1983, also 1993a). However, preliminary notes continue to be the principal source of information on Roman period sites in Sicily (e. g. Scibona 1987), and vast amounts of data on the later Greek colonists remain hidden in filed manuscripts (e. g. Becker Ms. D, cf. Becker 1995a, Ms. E).

Hypogaeum tombs in the territory of Naro are associated with a Roman catacomb at Contrada Canale (see De Miro and Fiorentini 1980: 113-118) and other Roman mortuary materials from the Contrada Paradiso. Unfortunately excavations such as these from the late 1970s routinely discarded human skeletal remains.

Forty tombs from the *sub divo* (under the open sky) cemetery area of the Contrada Lannari, dated by the excavators to the Roman Imperial era (1st-3rd centuries CE), were recovered in 1991. The excavators (Panvini and Zavettieri 1993-94: 866) note that an anthropological study had been conducted by 1993 on 14 of the individuals, including the *inumati [di] tomba n. 20.* However, they neglect to note who did this study, if a report was filed, or even which 14 skeletons were evaluated. In addition, T. 20 is not noted in their text, perhaps because it lacked tomb goods. The specific note that the bones of the person or persons in T. 20 had been evaluated is quite curious.

Late Roman examples: 3rd To 5th Centuries CE

Excavations conducted at Agrigento between 1985 and 1988 at a necropolis area identified as *sub divo* to the west of the Frangipane catacomb, recently have been published (Bonacasa Carra 1995: 28-32). These appear to date to the 3rd and 4th centuries CE. Reece (1999) evaluates the publications relating to this cemetery and a second Late Roman example, and Ronco (1995) more specifically places the burials of this cemetery in the 3rd to 4th century of the CE. The specific dates assigned to this cemetery at Agrigento are critical to the interpretation of the skeletal evidence.

Only a few of the tombs from this *sub divo* necropolis at Agrigento are shown in plan (drawings) and a few others (Tombs 4, 5, 7, 8, 10, 11, 19) appear in photographs (Tav. V, VII and VIII). Thus the record is far from complete, despite Mallegni's (1995) commendation. Not only are the bone locations problematical, but there is no overview of the cemetery to indicate how the graves are distributed. Once again a

very traditional focus on the recovery of artifacts shows a disregard for the specific and often even the most general contexts. The bone data are even less clear (Mallegni 1995). Bartoli's (1995) study purporting to do a nutritional analysis of this Paleochristian population is seriously lacking in focus, and the results fail to apply what is known about strontium levels to this population or to place these data within what is known from recent studies.

Ronco (1995) addresses the limited skeletal remains of 46 individuals from this necropolis at Agrigento, but nowhere are these data used to tell us about this site. While the level of skeletal recovery here is a considerable improvement over what was done previously (Griffo 1950), when only a few fragments of bone from Tomb 120 were recovered (Ronco 1995: 340, Tab. 1), Mallegni (1995) concludes that this report is far from being useful.

The "necropoli occidentale" of Termini Imerese apparently dates to the middle of the Late Roman period, the mid-4th century BCE (Belvedere 1993). Di Salvo reviews the human skeletal material from these excavtions and specifies the subsets involved. The 27 people of Boccone del Povero (Palazzo Villaurea) include 24 inhumations and 3 cremations (Di Salvo 1993c: 139-154). The three adults that represent or survive from the excavations at the Piazza della Gancia, that Di Salvo (1993c: 154-157) notes was excavated long ago, reflect the lack of interest in human bones so common at that time.

The *sub divo* cemetery at the Contrada S. Agata is of Late Roman-to-Paleochristian date and is one of the richest found in estern Sicily. Particularly impressive glass objects were found among the grave goods. Di Salvo (1989, 1993d) provides skeletal data from the very Late Roman or early Paleochristian (5th-6th centuries CE) populations excavated at the Contrada S. Agata in the area of Piana degli Albanesi excavated by Greco (1989). Piana degli Albanese is ca. 15km southwest of Palermo, and within the Province of Palermo. Of the 247 tombs identified ca. 200 have what is called a typical pair of burials. This pairing of bodies (husband and wife?) within a single tomb appears commonly throughout the Paleochristian period across the eastern Mediterranean (cf. Becker Ms. F). However, Di Salvo (pers. comm.) believes that as many as five or more people are represented in some of the graves recovered by Greco cf. 1989, 1993-94). Other related *sub divo* cemeteries are at Sofiana and at Salemi (Greco 1993-94: 1152), and many other less rich examples are known. However, no human skeletons appear to have been saved from any of these excavations.

Note should be made that in studying skeletons from the Piana degli Albanesi Di Salvo (1989) identified 64 adult individuals (43 M, 13 F, 8?). Many of her early studies have sex ratios of 2:1 or even 3:1, a finding that merits attention. This may reflect differential uses of cremation, as I suspect is the case with similar ratios found in many Etruscan contexts such as at Tarquinia (Becker Ms. H), or factors of evaluation. At a later date Greco suggests (1993-94) that this cemetery has a range of burials extending from the 4th to the 6th centuries CE.

Excavations of another Late Roman site dating from the 4th to 5th century CE in the area of Agrigento included a necropolis of *arcosolium* tombs, but the basic excavation data remain unavailable. While studies of the human skeletal remains from this and other sites of later dates would add immeasurably to our database, we cannot be certain from the reports that any human bones were even recovered from these many excavations. Fortunately, recent excavators are changing this situation through their inclusion of increasingly more detailed skeletal data.

Paleochristian period

Interest in the Paleochristian period throughout Italy is growing rapidly, with the greatest efforts expended in northern Italy where impressive Greek and other remains do not overshadow interest in this historically interesting epoch. The archaeology of other parts of the Italian Byzantine world recently has gained the attention of several major scholars (e.g. Christie 1989; De Angelis 2001). The important research of Emma Blake (2001, In process A) notes that vast numbers of prehistoric rock-cut

tombs, largely of Copper or Bronze Age (see above) were cleared for reuse during the Byzantine era (cf. Uggeri 1974). Not now evident is whether this emptying of these Sicilian tombs for reuse is an activity related to the Byzantine use of caves in Cappadocia (see Rodley 1985) and elsewhere in the Mediterranean region about the same time.

Christian-byzantine period

Orsi's (1898b) study of Byzantine period churches in the area of Siracusa (see also Orsi 1910) reflects an interest that was not matched by contemporary archaeological interest in Byzantine churches and their cemeteries. A few studies of the Paleochristian period (e.g. Giunta 1974) were part of a renewal of interest that have led to increased archaeological attention to this significant era.

In recent years Christian-Byzantine period sites in western Sicily have seen a great increase in the numbers of excavations that focus on them (e.g. Bonacasa Carra 1984). Skeletal recovery and analysis continues to be infrequent. However, from the eastern end of Sicily we have Mallegni's (1992: 248) citation of a manuscript by Bartoli and Vitiello (n.d.) relating to the bones from the Church of S. Tommaso di Messina. Fabbri and Carnieri (1997) claim to have data on 11 medieval Christian burials from Segesta that they believe to be contemporary in age with Muslims known from Entella. They also refer to data on 52 individuals from a Late Medieval context at "Roca," but none of these data are at present available.

Note must be made of some parallel studies of the Byzantine period skeletal remains from Michelica (Modica), in southeastern Sicily near Ragusa (see Passarello and Alciati 1969b; cf. Fabbri 1992c). A similar study has been made of skeletons dating from the Muslim period occupation at Agrigento (Fabbri n.d.).

Medieval period: Christian sites

Ginatempo's (1988) survey of skeletal studies in Italy, focusing on the Medieval period, generated an excellent bibliography that has a particularly strong focus on northern areas. Ginatempo's compilation accurately reflects the published literature on human skeletons of this period. Concern with the study of Medieval skeletal populations is extremely strong in northern Italy (cf. Becker 1997d) and declines in nearly direct proportion to distance from the Alps. Bresc and Bresc (1976) were among the first to show concern for the recovery and study of Medieval skeletons recovered on Sicily. Ginatempo (1988: 60-64) notes that at least two Sicilian excavations prior to 1980 involved efforts to collect human skeletal remains of the Medieval period in a systematic fashion (Bonomi 1964; Isler 1975), but neither of these skeletal populations appears to have been studied. General questions relating the health status of a population and the paleopathological evidence from the early Medieval period have been addressed by Mazzi (1981), but no single Medieval site has yet been the focus of a serious programme of skeletal retrieval and analysis.

Excavations of medieval levels at the extemely well published site of Monte Iato (Isler 1995) have produced a small but interesting collection of human skeletons that have been studied by Di Salvo (1995a). A brief osteological note (Di Salvo 1995b) on the contemporary medieval population from Calatrasi (Monte Maranfusa, see Spatafora 1995) offers another view of the medieval people from this area. Two medieval period crania from Christian Morgantina (Becker 1998a) provide complete metric data that may become important in future studies. A medieval period burial at La Muculufa, set against a Castelluccian period wall, has been reported by McConnell and Bevan (1999: 200, Fig. 6). The bones are scheduled for study.

The Medieval period: Islamic sites

The important period during which an extensive Muslim influence is documented throughout Sicily now is being examined for its possible biological impact (cf. Mallegni 1992). An impressive publication on the people of this period, *Federico e la Sicilia* (Di Stefano and Cadei 1995) provided scholars with an opportunity to gather together a great deal of data pertaining to the 13th century.

Included here are some of the significant distinctions between Muslim and Christian populations during the period from the 10th to 13th centuries CE. These follow Guglielmino (1992), who offers an important bibliography relating to Arabic burial rituals and rites of passage. Muslim burials often can be distinguished from Christian on the basis of the mortuary pattern alone. Separation by the evaluation of skeletal traits has yet to be achieved.

In addition to the Islamic cultural data noted above, an Islamic necropolis has been tested at Monte Catalfaro near Mineo in eastern Sicily (see Arcifa et al. 1999). This Islamic burial area was later used for a Christian cemetery. Human remains from both traditions have been respectfully curated and we expect that they are available for study. Di Salvo and Germanà (1992) provide an excellent report on the Muslim population from excavations at the Castello San Pietro in Palermo.

Excavations in the area of Entella, where a Bronze Age component is well documented, also revealed burials dating from the Hellenistic and Islamic periods, as noted above (Guglielmino 1988). The medieval Islamic component at Entella (Guglielmino 1992, 1995) is at Montevago, which lies closer to Poggioreale and is on the other side of the river from Entella (see Castellana 1992a). This Islamic occupation has been placed in the period 850-1246 CE, with 14C dates (Nenci 1988) on Tombs 4 and 16 falling in the latter part of this era (ca. 1160s). The human remains from this cemetery near Entella and a related Muslim cemetery have received unusual attention (Fabbri 1992c, 1995; also Bartoli 1992). Fabbri (1992c) provides all of the basic osteometric data, and notes the use of the Trotter and Gleser formulae for the calculation of stature. This enables systematic comparisons to be made with other data sets. However, there appears to be some confusion derived from Fabbri's earlier report (1988) on the Muslim population from Entella that lists the 48 individuals identified in the 27 tombs. Fabbri's later studies (1990, 1992a), following excavation reports by Guglielmino (1992), indicate 14 Hellenistic and 15 Islamic burials, for a total of 29. Since these reports also note Archaic and Eneolithic period materials there is a possibility that the 19 burials noted in the earlier paper (1988) may all date from before the Hellenistic period. Complicating the problem is Fabbri's (1992b) discourse on the "methodology" used but presenting only limited data regarding a few burials, for which the age is not specified.

Five years later Fabbri and Carnieri (1997), in a paper on dental wear, present a new set of numbers. In the 1997 publication 21 medieval period Muslim and 10 Hellenistic burials are noted. At no point are the data from these several papers systematized or related, and even the most basic goals of evaluating numbers (MNI) and the age and sex of the identified individuals are ignored. These problems are characteristic of several collections of papers supposedly relating to a single Sicilian skeletal population in which critical editorial oversight is lacking even as applies to each "contribution." In the case of these burials from the are from Montevago (Entella) area, Bartoli's (1992) paper on the elemental analysis of the human bone both compounds these problems relating to evaluation of numbers, age and sex, but also does not appear to provide the nutritional insights suggested by its title.

Roger Wilson (pers. comm. 6 July 1999) notes that the three skeletons excavated at Campana (Agrigento) in 1997 and 1998 were positioned on their right sides. This suggests an Islamic burial ritual, which in turn suggests dates for these burials that fall somewhere within the 9th to 12th centuries. Each of these three extended burials is aligned east to west, with the head to the west so that they face the south (Wilson 2000: 351). This seems to correct Johnstone's (1997) suggestion that one of these burials, an adult male (Unit 328), dates from ca. 450, although he may be correct in evaluating the other two (Units 349 and 350), an adult male and an adolescent, as being buried some 50 years later (Johnstone 1998). Johnstone's error may be in placing the series at 400 or 500 years too early in time.

Wilson (2000: 352), citing Castellana (1992) and Molinari (1997), indicates that burials in graves similar to the Muslim interments at Campana (Agrigento) that

may be of the same period around 800 to 1200 CE were identified at the western Sicilian sites of Montevago, Segesta, Monte Iato, Entella, and Palermo. Regarding the graves at the necropolis at Segesta, Di Salvo believes (pers. comm. 7 June 2001) that during the latter years of recent excavations at Segesta, or ca. 1995-2000, an Arabic necropolis was identified and skeletal material was recovered for study (Di Salvo In preparation A).

The Islamic period also has been revealed in the excavations that were made the summer of 1986 in the Piazza XIII Vittime, at the Castello S. Pietro in Palermo. At least 12 burials of the XI-XII century (Norman period) were recovered from Saggio B (or the A, B, C series). Di Salvo (1993e) provides some notes on the bones from this somewhat dispersed group and suggests that they may represent members of a single extended family. The statures of the seven adults (5 M, 2 F) identified here were calculated using six different methods, some of which are not referenced (Di Salvo and Germanà 1992). Two Muslim graves found at La Muculufa (McConnell and Bevan 1999: 198) add to the small but growing numbers of skeletons of this period that will provide interesting biological data.

The relationship between the decline in power of these medieval Muslim populations and the supposed 15th century immigration of Greek Orthodox (Eastern Rite) "Albanians" into Calabria and Sicily is not clear (cf. Nicolucci 1864: 57-58). The three or four villages of these immigrants in Sicily, as well as the dozen or more said to be in Calabria, have attracted some recent interest on the part of physical anthropologists (see below). The alleged retention of the original language of these migrants suggests that the populations may have maintained a distinct genetic pool into the late 20th century but to date no biological evidence has been published to support this possibility.

16th and 17th Centuries

Of interest to studies of human biology on Sicily is the interesting DNA study conducted by Rickards, Martínez-Labarga, Favaro, et al. (2001). The remains of Prince Branciforte Barresi and four other members of the family (two children, his brother, and an unidentified juvenile) were subjected to review in this pioneering study. These five people had been buried in the chapel of the Church of S. Benedetto in Mililetto in Catania (see Rickards, Martínez-Labarga, Casalotti, et al. 2000a: Fig. 18.1 for map locations. The results of the study provide some suggestions regarding the biological relationships among these members of the Branciforte Barresi line during a period when this family was at the height of their power.

Post-medieval mummies

Interest in naturally mummified remains has a long history in Italy (Maggiorani and Morrigia [1872]). The study of mummified remains from church vaults and other contexts in various parts of Sicily provides an opportunity to examine human soft tissue that is not usually recovered from archaeological excavation. Todesco (1993-94) reports on an example dated to the 1700s or later (also, see Todesco 1989). Amadei and Fornaciari (1995) have examined the 14th century mummy of San Corrado Confalonieri that now resides in Noto. They also studied the 18th and 19th century mummies that are in the church of Santa Maria della Grazia in Comiso (see Fornaciari and Gamba 1993; also Ciranni et al. 1999: 427). These 18th and 19th century mummies might be considered as part of the "modern" population noted below. An extensive review and well illustrated review of the data relating to the corpse of S. Corrado Confalonieri has been published by Fornaciari and Bruno (1991). They also state that they compared data derived from S. Corrado's bones with: *"dati analitici dell'osso compato di S. Corrado con quelli ottenuti dai resti scheletrici di cinque individui vissuti a Noto Antica."* Fornaciari and Bruno 1991: 70. Their footnote number 24 indicates that the skeletal remains of these five people that were used for comparative purposes were provided by Avv. Francesco Balsamo, but no further data are provided regarding the dates of these people (cf. Balsamo 1988).

Modern skeletal populations

The use of modern or post-1800 CE skeletal populations from Sicily for anthropological research studies, as elsewhere in the world, appear to have come full circle. Generally overlooked in the study of ancient human remains from Sicily is the collection of "modern" material of Sicilian origin that had been stored in Firenze. Data from this modern Sicilian material was published as a comparative appendix to the San Teodoro report of Graziosi (1947: 224-239). The bones of these "modern" Sicilians are, presumably, still available in the collections noted. Of particular interest is the distribution of these skeletons, which includes three distinct regional populations as follow:

a) Skulls and long bones (N=90) of Siracusans, presumably those who died in 1901 (see Parenti 1952), collected by A. Favara.

b) Skulls (N=10) from a "XVII secolo" population in Palermo collected by Prof. Maggiorani, and donated to the Museo Nazionale di Antropologia e Etnologia di Firenze by G. Nicolucci.

c) Skulls (N=15) from an undated context in Catania and donated to the Museo Nazionale in 1925 by N. Beccari.

Note should be made that a large number of other "modern" skulls are believed held in collections in Catania. More than 500 Sicilian skulls now are stored in what now is L'Istituto di Anatomia dell' Università di Catania, providing a useful modern sample for study. Recently these skulls in Catania were examined for specific epigenetic traits (Iannello and Urzi 1979, Urzi and Iannello 1979), providing us with an interesting database that needs to be controlled for time and space. This information might be compared with the subset of Sicilian data from Vecchi's (1969) studies of discontinuous cranial characteristics of ancient Italians of various periods, noted above. His sample of 336 human skulls, all at the Museo del Istituto di Antropologia at "La Sapienza" in Rome, included a total of 88 examples from Sicily. These 88 skulls provide one of many collections that merit our attention because they contain examples from Sicily.

The church of Santa Maria della Grazia in Comiso (Ragusa) is said to have 107 skulls resting in horizontal niches. The church was built by Capuchin friars ca. 1616 and then was consecrated to their use. While some of these 107 skulls may derive from extraneous sources, possibly including looted ancient tombs, they supposedly represent only the friars associated with the church and the local laity. Quigley (2001: 172) reports that the skulls of the friars are said to be placed in an orientation distinct from those of the laity.

Returning our attention to the collections of skulls at "La Sapienza" in Rome, note should be made of the vast numbers of human remains held at diverse institutions throughout Italy and around the world. In addition to the "La Sapienza" holdings, the Institute of Anthropology in Firenze has an impressive collection of skulls, presumably derived primarily from Italian sources. The Museo di Antropologia ed Etnologia in Firenze was founded in 1869 by Paolo Mantegazza. Mantegazza made a considerable effort to secure bones from all parts of the new nation (Quigley 2001: 137-139). His successful efforts led these collections to being transformed into the National Anthropological Museum. Among the more than 5,700 skulls and other remains now in this collection are a considerable number from Sicily, some of which had been secured by G. Nicolucci (see Appendix I). Specific listings of these Sicilian remains and a review of the surviving documentation may prove useful.

Giustiniano Nicolucci's considerable efforts to retrieve human skeletal remains have resulted in a widespread distribution of materials, including 166 skulls that went to the Museum of the Royal College of Surgeons of England, in London (Quigley 2001: 140-141). The Royal College also has in its collections the skeleton of Caroline Crachami (1815-1824), famous during her very brief life as the "Sicilian dwarf." Crachami was born in Palermo and at the time of her death from tuberculosis, at age nine, she was only 20 inches (51 cm) tall. She died in London while she was touring, or being exhibited, as the famous "dwarf." Quigley (2001: 140) documents the sad

story of how her tiny bones came to find their way into the Hunterian Museum, and ca. 1995 were relocated to the collections of the Odontological Museum. The fate of this child parallels that of numerous "performers" from all over the world who were brought or induced to tour Europe. These people were exhibited as curiosities after having been gathered by entrepreneurs of all types from their homes in the New World as well as from southern Africa and elsewhere.

Skeletal studies often reveal some interesting behaviors commonly associated with "ancient" times but also found in relatively modern populations. Germanà and Fornaciari (1990) identify a case of trepanation, believed to date to the 18th century, from Comiso (Ragusa), possibly from among the collection noted by Quigley (2001). This is the most recent of all examples of trepanation known from Italy (Germanà and Fornaciari 1992), but unclear is whether this was a surgical intervention to treat a head wound, or an attempt at traditional attempt at the freeing of demons.

Important to the history of physical anthropology on Sicily is note of the early date at which studies of modern populations were being made. Moschen's (1893) earlier work suggests that studies of recent as well as living populations, and the crania of the recently deceased, may have begun in Sicily by the early 1850s. This type of study was part of the 19th century investigation into the significance of cranial form deriving from Joseph Gall's phrenological studies. Paul Broca (1875) had formalized these studies, which had their most important "applications" in Lombroso's (1876) studies of supposed criminal cranial types. The racist ideas of Lombroso and other 19th century proto-anthropologists are less commonly noted today, but they formed an important and tragically negative aspect of early research in human biology.

Two studies of recently deceased human populations from eastern Sicily are more interesting for what they tell us about treatment of recent skeletons than for the data they produced. The earlier of these two projects (Occhipinti 1937) used a population of 100 skeletons (half female) of victims of the 1908 earthquake in the Messina area. This study quantifies the generally known difference between male and female pelvic configurations. Parenti's (1952) study of cranial angles used a series of skulls from Siracusans who died and were buried, in 1901, in the Cimitero Comunale di Siracusa. These modern people had been exumed in 1909 by Favara, and presumably are those that went to Firenze thereafter. These studies, as well as those noted in the following paragraph, all appear in the *Archivio per l'Antropologia e la Etnologia*, and typify the kinds of osteometric work common early in the 20th century. With the exception of studies on the paleolithic people from San Teodoro (Maviglia 1940), most of the skeletal reports of this period appearing in this journal presented information regarding skeletal and other studies conducted outside of Italy.

These studies of modern skeletal series have had few applications in the more recent past. Capecchi (1957) provides a history of these studies as an introduction to his own highly focused examination of tibia flexion. While supposedly considering the evolutionary aspects of his research, Capecchi's results were inconclusive. At a later date Cappieri (1962, 1963) studied stature among modern Sicilians and compared the data with information from the 19th century male population. Cappieri (1962) provides "data on the 1854 levy" along with conscript data from 1861 (beginning of the Kingdom of Italy) and a national report of 1874. The data from the period 1859 to 1863 indicates that the Sards and people of Basilicata had the lowest average statures in the Kingdom, and that Sicilians were far from being at the bottom of this scale. Since stature can be taken as an indication of nutritional level, these data suggest relative resource availabilities in these different regions. In Scandinavia at a slightly later date parallel studies were made in which the specific goals were to provide improved diets to the entire population. Increases in stature among the lower classes were taken as evidence that this program was successful.

Guerci (1977) offers a parallel Italian database focusing on stature in which the subset for Sicily appears as one of the 15 regions of the country. Guerci provides a sample of 307 Sicilians among his total of 7,163 individuals from Italy (4.3%). These

data in general are also useful in charting changes in stature as a reflection of dietary changes, with the modern populations becoming taller and therefore assumed to be better nourished (cf. Fishberg 1905). Related studies of contemporary biological issues on Sicily, such as shifts in fertility (see Schneider and Schneider 1996), might be addressed through studies of modern skeletal populations.

Alia: contemporary research with modern skeletons

One of the more important contemporary programs of skeletal research on Sicily involves a recently revealed modern population from Alia. Alia is a small rural village located some 80km to the east of Palermo. The "Trinacria Project," including research on both ancient and modern Sicilian populations (Chiarelli 2000), was developed by B. Chiarelli (Università degli Studi, Firenze), during the period when he served as a temporary Professor of Human Biology in the Faculty of Science at the University of Palermo. His extensive program of skeletal studies in the Palermo region has also involved preservation of the 19th century skeletal materials at the village of Alia and the construction of a fascinating museum at that site.

At Alia there are over 300 human skeletons from the nineteenth century, mostly representing the victims of the cholera epidemic of 7 July through November 1837. These remains were recently moved from the cave that served as a mass grave for victims of the "plague" (Bramanti and Vernesi 1996:2). As would be expected, these bones provide excellent documentation from a single village at a single point in time. Guccione (1991: 287-317) suggests that in additon to the official count of 306 dead from the 1837 epidemic (pp. 304-308), victims of other plagues may have been deposited in this natural cave. On 23 July 1837, some 16 days after the first of the cholera deaths, this cave in the Contrada di Cozzo di Faso was designated as a *camposanto*, and now is identified as the *camposanto vecchio* of the village (Guccione 1991: 307).

Although these hundreds of cholera victims from 1837 may represent a subset of the local population, differing from the survivors in ways yet to be determined, they provide an impressive database for the evaluation on injury and pathology rates. Mitochondrial DNA sequences have been sought (Vona et al. 2001). The excellent surviving dentition of these people also provides a benchmark situation despite the extensive post-mortem loss of teeth. A nearby necropolis dating from the Roman and Byzantine periods, located in a series of caves only five km. from Alia, provides an excellent comparative population sample from this same area but from a long period earlier in time (B. Chiarelli and C. Di Gaetano, personal communications, June 1996). Thus biological changes through time have been studied for this specific area (Chiarelli In press A), with the results providing a possible benchmark for rates of genetic shift in a small community.

Modern skeletal studies also might be related to Messeri's (1959) study of possible phenotypic relationships in "endotelia" (endotheliomata) among Sicilian children. Messeri found the same incidence among children in Firenze, but his statistical methods do not appear to enable a critical evaluation to be achieved. Studies of microcythemia, the presence of abnormally small red blood cells, in contemporary Sicilian populations (Silvestroni and Bianco 1950) were part of efforts to understand the modern biology of this island's population. Study of seasonal birth and death patterns in the Aeolian Islands (Rossi et al. 1974) may ultimately contribute to our interpretation of biological data from Sicily.

There is a large and growing literature relating to the extraction of blood type information from bones, and the use of these data in reconstructing "genetic" lines. Amidst all the controversy there has never been a successful and controlled demonstration of the feasibility of these procedures for characterizing a population using blood types. Claims of the validity of this line of research appear to derive almost entirely from Eastern European researchers (see the brief discussion in Semino et al. 1989).

The heterogeneity of the modern Sicilian population has been documented through attempts to identifiy linkages using names and surnames as they are distributed in recent populations (C. Guglielmino et al. 1991). Weak genetic linkages are noted in

Sicily as elsewhere, although Greeks in the province of Reggio Calabria appear to be a relatively distinct population (Vienna and Biondi 2001). DNA studies, however, provide a possible means by which these concerns may be addressed in a more effective way.

Dna analyses and other modern genetic studies

In addition to the numerous uses of DNA research in contemporary medicine just noted above, several modern approaches to evaluating the genetic structure of various populations on Sicily have developed since the late 1980s (e.g. Rickards, Biondi, De Stefano and Battistuzzi 1988). Rollo (1999) provides an excellent overview of the applications of modern studies to archaeological problems using DNA research. Many of the current programs using a molecular approach to the study of ancient populations have been summarized recently in an important overview volume edited by Renfrew and Boyle (2000). The studies collected by Renfrew and Boyle take us in directions that were barely considered just a few years ago (Robb 1996). In addition to the data from Sicily, the several contributors to the Renfrew and Boyle volume offer information from peninsular Italy as well as throughout the rest of the world that can be compared with the Sicilian database.

The rapid expansion of DNA related studies to the understanding of the genetic and population history of Sicily provided the basis for a special issue (Supplement 2) of the *Journal of Cultural Heritage,* edited by Valentino Romano and Francesco Ayala. The introduction by C. Renfrew (2000) indicates the potential contribution of these Sicilian based studies to the remainder of the Mediterranean islands. S. Tusa (2000b, see also 2000a) reviews the ethnic dynamics of the island as reconstructed through archaeology and history. C. Malone and S. Stoddart (2000, cf. La Rosa 1989) place these data into the island's geographical provinces. Scozzari's (2000) overview of the potential of genetic studies for understanding the history of the island (see also Romano et al. 2000, De Stefano 2000) points the way to the future.

Theoretical overviews of the research potential of DNA studies for archaeology have proliferated (e.g. Rickards et al. 1997-98; Rickards et al. 1998; Rickards et al. 1998; Rickards et al. 2000). A theortical focus is now taking shape (see Rickards et al. 2000a, 2000b), but the findings now available remain poorly tied to the few studies of ancient populations conducted to date (e.g. Martínez-Labarga et al. 2000). Some success in reconstructing residence patterns through genetic typing of medieval skeletal remains has been reported from continental Europe (Gerstenburger et al. 2002). Comparable results from Sicily may be expected.

The process of reconstructing genetic history and structure of ancient populations has proven more difficult than was suggested by these pioneering research programs (Rickards et al. 1992), leading to a focus on various allotypes as well as different sampling series (Walter et al. 1997). Some early epidemiological findings (e.g. Romano et al. 1991) were very interesting and demonstrated the modern directions being taken by medical research in this part of Italy. However, the results of this research did not appear relevant to the kinds of concerns held by archaeologists and historians. The highly important goals of improving human health are being pursued in ways that also may be of use to scholars interested in understanding the past populations of Sicily and how these ancient peoples relate to the modern inhabitants of the island.

While the potential for DNA studies to supersede most of the other analytical techniques now being used in studying skeletal populations is great, the reality remains quite different (cf. De Angelis 2001: 145). Approaches need to be standardized and made readily available at reasonable cost. As Stone et al. (1996: 237) note, "Standard osteological methods, however, are less expensive and more rapid when skeletons of adults are complete and the bones are in good shape." In fact, numerous double-blind studies of skeletal populations, where the bones are extraordinarily fragmentary or consist only of cremated materials, have demonstrated that skilled analysts can generate highly reliable information much faster and cheaper than feasible through DNA studies (see Becker and Salvadei 1992, Becker 1995a, Becker Ms. E; but see Casalotti et al. 2000).

Sineo, who specializes in chromosome research, provides important new approaches to studies involving DNA in the reconstruction of populations and their histories. Other genetic related analyses include studies of HLA (Olivetti et al. 1986), variations in immunoglobin polymorphisms, and also RFLP's (restriction fragment length polymorphisms). These have been available for over 15 years, and now are being applied in Sicilian paleodemographic studies. At this time aDNA studies are the most reliable when materials are collected under the most stringent conditions, followed by equally careful PCR amplification and specific sequence analysis. As Luca Sineo (pers. comm. Oct. 2002) points out, at present "the most reliable results are obtained with HVR-1 mtDNA cloning and sequencing."

Chiarelli's "Trinacria Project," with its extensive interdisciplinary programs focusing on the "recent" population from the village of Alia (see above), has as one of its goals the determination of sex for the more than 300 individuals now available for study. This research not only will help to determine the cost effectiveness of such research, but also the use of double blind studies employing traditional sexing methods will test the effectiveness of DNA studies. Researchers should note, however, that DNA studies also have the potential for the characterization of individuals and for answering many of the questions that have been discussed here.

The reconstruction of ancient "genetic lines" among a population using DNA studies has had considerable success in the New World. Recent theories regarding a series of waves or migrational "pulses" from northeast Asia into the New World have been validated through mitochondrial DNA research (Schurr 2000; Lell et al 2002; cf. Chen et al. 2000 for southern Africa; and, Schurr and Wallace 2002 for southeast Asia. A parallel model of migration or migrations into Sicily may be inferred. One or more early waves of migration may have brought intitial populations to the island tens of thousands of years ago (Torroni et al. 2001). The Phoenician and also the Greek trade and colonial ventures may be considered as more recent population movements. The extent of these recent migrations merits testing using the new methodologies. Ghiani et al. (2002) have already suggested that the 13 traditional genetic markers that they tested suggest genetic boundaries dividing Sicily into three distinct areas. They place the primary division in the center, dividing the island into eastern and western halves. Yet these are not reflected in those studies that attempt to decode modern disease distributions (see also Mobile et al. 2000). Numerous studies that may provide insights into these differences within the island populations are in process (e.g. Asmundo et al. 1998, Perlmann et al. 1997).

In general recent DNA studies mark a major methodological and theoretical advance over those pioneering efforts of only a decade ago (e. g. Semino et al. 1989). Other studies conclude that research regarding "the very heterogeneous population of Sicily" (Romano et al. 2001) need new approaches using several analytical methods to yield effective genetic protocols. Studies of phenylalamine hydroxylase gene mutations in the USA, which includes "one of the most heterogeneous populations, with homozygosity values similar to Sicily and ethnically mixed populations in Europe" (Guldberg et al. 1996; see also Guldberg et al. 1993) suggest some degree of biological uniformity. Thus the delineation of specific populations within Sicily, or the recognition of target groups, is needed before we can enquire into their ancestry or match aspects of DNA records between living and past populations.

Barbujani et al. (1995) investigated possible geographical distinctions of mtDNA among Italian populations. As suggested above, the DNA studies of Rickard and Martínez-Labarga (1988) suggest that there may be ways to refine the analytical methods used to examine possible patterns of ancient migration as they apply to Sicily (see Rodríguez-Larralde et al. 1994, Bramanti and Vernesi 1996:1). The first results of these DNA studies, begun ca. 1991, focused on southern Italy (Rickards et al. 1998b, see also 1998a, 2000). The specific meaning of this line of research remains far from clear, but foresighted archaeologists should now consider the special collection and storage of bone samples, from among the normally recovered skeletons, for future DNA research. Walter et al. (1997) are refining DNA studies within Sicily, with

results that appear promising. At present samples for DNA analysis should not be touched except with gloves or instruments specifically intended for their collection. These samples also should not be stored in sealed containers, such as plastic bags, which may facilitate the growth of organisms that could distort the analytical process. Dry storage under sterile conditions would be best, with freezing a possible alternative (Bramanti et al. 1996: 2).

Directions for future studies of human skeletons in Sicily

Sicily remains ripe for basic studies of human skeletal remains from archaeological sites that can contribute both to the understanding of site-specific as well as the regional mortuary patterns (cf., for example, Anderson 2000). De Angelis (2001: 145, 155), in his important review paper, addresses several new trends in archaeology as well as surveying more traditional studies that refer to basic and traditional problems. Of particullar concern in this review is the lack of biological studies that could be of significance or provide answers to questions regarding patterns or rates of intermarriage between colonials and natives. De Angelis notes a number of aspects of life that are reflected in these archaeological contexts that would be particularly amenable to biological review.

Chiarelli's program and Sineo's research using molecular biology are among the programs now in process that are important for setting new standards to solve some of the basic questions traditionally addressed through skeletal studies. Another interdisciplinary study is developing under the direction of Belvedere (University of Palermo) in conjunction with the Superintendancy in Trapani at Kalat in northwestern Sicily. Their survey program is certain to reveal material of interest to physical anthropologists as well as archaeologists.

Essential to any study involving skeletal populations is a complete and accurate listing of the individuals present including an age and sex evaluation, specific provenance within the site, plus an archaeologically assigned date. The location of these bones in storage needs to be noted to permit confirmatory and additional study. Analyses of skeletal populations from specific archaeological sites need to focus on the evaluation of age and sex to provide the excavators with answers to their basic questions. Combining this information with the dates and cultural contexts into which the population is placed enables the physical anthropologist to address larger questions. Of note are recent works (Howells 1989, 1995) that use computer modeling to examine cranial configurations in a much more sophisticated manner than previously possible. These new studies may help us to identify populations and to make better evaluations of individuals within these groups (but, see Gravlee et al. 2003, and the discussion of Boas's findings).

The calculation of stature merits special note, as authors need to provide raw data on bone length and clear statement of which formula is used in the computation. Quite possibly one of the many formuli now available for the calculation of stature may be applicable to populations that had lived on Sicily, or in specific parts of the island, during the Mesolithic as with any other particular time period (cf. Becker 1999a; also Constandse-Westermann et al. 1985).

Beyond these fundamental research questions we may consider several possible types of study of use in the reconstruction of an ancient society. Most important may be the reconstruction of ancient demographics. Some scholars see paleodemographic studies as meaningless (Bocquet-Appel and Masset 1982, 1996). Their conclusion derives from studies including one in which various Italian populations, divided into geographical areas and dating from 2000 BCE to 1000 CE, were found to have no correlation with the anthropometric record (Bernhard and Kandler-Pálsson 1986: 163). Results such as these lend support to the conclusions of Bocquet-Appel and Masset (1996).

In fact, the increasingly rich osteological database and improved computer assisted evaluations (e.g. Key and Jantz 1981) have allowed paleodemographic studies to become increasingly accurate (Buikstra and Konigsberg 1985). However, we remain

very much aware that procedural and statistical concerns must be considered in the evaluation of each study (see Bianchi et al. 1980, 1982). Recent reviews (see Hoppa and Vaupel 2002) and new approaches to paleodemography indicate that such studies may have significant value in reconstructing archaeological contexts and in helping us to understand culture history.

Gender issues have become a specific focus in modern studies (cf. Whitehouse 1998), and this line of research in archaeology relies on accurate evaluation of sex of all skeletal remains. Beyond our concerns with basic age and sex evaluations of human skeletons, increasing attention is being directed toward the calculation of stature (e.g. Becker 1999a). Stature calculation becomes a primary tool in the evaluation of social classes in increasingly stratified societies, such as those societies that emerged during the Iron Age. While intra-populational calculations need only consider possible status variation, reliance on the formulae presented by Manouvrier (1892, 1893) or by other earlier data sets, avoids the regional and temporal variations that are needed to reflect cultural and biological variations. Some scholars utilize Olivier's (1963; see also Olivier et al. 1978) updated and specifically targeted methods for the evaluation of stature. Di Salvo and Germanà (1997), for example, use the specific formulae for the calculation of stature derived from Olivier's [sic] earlier publication (Olivier 1963).

The Olivier formulae for the calculation of stature, like those developed by Trotter and Gleser (1952, 1958; also Krogman 1962), may not be the best set to use for any specific population (see also Ubelaker 1989). Consideration of the specific formulae best suited for the calculation of stature in any of the many diverse Sicilian populations cannot rely on data from other regions (e.g Di Salvo and Germanà 1997, which employs data from Germanà 1995: 76-77). Formicola's (1983) call for establishing methods of stature calculation specific to Italian populations have received some attention (e.g. Becker 1999a), but should be repeated for various locations and periods of time. The results of these studies (Becker 1999a) should be considered when formulae are suggested that apply to wide areas and long periods of time (also Formicola et al. 1996). The presentation of raw osteometric data remains an essential part of any study of stature.

Without excavation data from a complete cemetery, and corresponding careful skeletal studies of the human remains, we remain woefully without a strong basis for the reconstruction of ancient lifeways through ancient bones. At present the rarity of adequate numbers of intact crania from any ancient site in Sicily deprives us of the metric data needed to generate statistically significant figures for analysis (see Howells 1975; also Rogers 1984). A brief look at an earlier attempt to do biodistance studies via craniometry (Facchini, Basili and Pettener 1982/3) reveals why such early approaches were unsuccessful. Their use of only six variables for a widely dispersed area, with no temporal nor spacial controls, largely precluded the success of their effort. Thus our ability to identify specific Sicilian populations through craniometric studies continues to be limited, a problem not at all unique to Sicily or Italy in general (e.g. Musgrave and Evans 1980; Disi, Henke and Wahle 1984). Similar problems plague scholars across the Mediterranean region, where parallel attempts to solve this problem have been made (see Arensberg 1973). Where good preservation and adequate samples are available, results from craniometric analyses are impressive (Jantz 1972, 1974). As Jamieson (1995: 46) points out, "the methodology of bio-distance measurement and statistics on cranial remains has been steadily improving."

Questions regarding the biological impact of migrations on this line of research have been addressed in recent studies of past populations (Soliani et al 1985; Molleson 1992; Becker 1994). Various studies relating to migration consistently suggest that the dominance of aboriginal or early genetic markers continue into the present, perhaps indicating that the impact of real or inferred migrations cannot be demonstrated easily by biological studies. Linguistic data often has been shown to have only a weak correlation with anthropometric and/or genetic data (Jorde

1980). The Jorde studies need to be replicated using contemporary and much more sophisticated analytical techniques. DNA studies (see below) may provide the answers to these questions.

Examples of flawed methodologies can be seen in several studies using data from the modern populations in the "Albanian immigrant" villages around Piana degli Albanesi, in the province of Palermo. Three Sicilian villages (Piana degli Albanesi southwest of Palermo, S. Cristina Gela just east of Piana degli Albanesi, and Contessa Entellina near Entella), and possibly a dozen or more in Calabria, are said to have been settled by Albanian immigrants during the 15th century. Also commonly said about these villages is that the inhabitants still speak "Albanian" rather than a Sicilian language or dialect of Italian. This unsubstantiated linguistic inference were presumed to indicate genetic continuity, leading these supposed "Albanian immigrants" to became the focus of several studies of blood types conducted among the same "population" (Corrain and Capitanio 1978, Ajovalasit 1978; cf. Corrain and Capitanio 1983 and several other later variations). The Bartoli et al. (1988) trace element study is related. While the basic idea was interesting, the methodologies used were severly flawed, lacking internal consistency or historical documentation.

Various Late Bronze Age "cultural" differences identified among the several native peoples of Sicily were suggested a century ago. These "groups" and their borders now may be biologically confirmed, or rejected, using recently developed programmes for imaging three dimensional, computer generated craniometric models for use in biodistance studies (see note 1). This is but one of the many directions of study now available to contemporary physical anthropologists. In turn, the discrete biological units representing these native peoples could then be compared with protohistoric and historic immigrant colonists from various parts of Greece and from Carthage (see Becker 1985), and later from Albania. Such comparisons may allow us to see differences and to plot the course of biological merging through time. The detection of biological microevolution, in space and time, remain important to the establishment of populations that can be compared meaningfully, although simple temporal comparisons are now considered sufficient by many scholars.

Ideally, studies of the rates or speed of biological merging of these colonizing peoples, from the earliest trading ventures (see Bernabò Brea 1957; Fisher 1985) down through the Hellenistic period and through the Roman period, should help us to infer patterns of cultural interactions between these various groups. Biological studies also may help us to understand unusual variations in cultural behaviour for which no explanations are evident. Pelagatti (1976) pointed out that the people of Casmene, of the second settlement from Siracuse, had burial methods that differed from those known in any other Sicilian colony (see Dunbabin 1948:101). In fact, mortuary rituals vary considerably from city to city, in a pattern that may reflect interesting cultural processes that might be decoded through anthropological study.

Another goal of projects relating to the human skeletal biology of Sicily would be to provide some type of biological characterization of indigenous Sicels prior to the impact of extensive trade and colonization, both from the Greek world, as well as from Carthage and the East. The intermediate location of Sicily between Africa and penisular Italy renders the biological situation very interesting. Although we are not able to identify or characterize an African population or individuals in Sicily (Jamieson 1995: 46), the expected clines, or biological variations through space or time, should be evident from Africa to Sicily and then to the mainland.

Of note are some findings that various linkages between Sicily and northern Africa appear extremely weak (Ragusa et al. 1992), a result consistent with various genetic (Fei et al. 1989) and non-genetic studies (but, see Travi et al. 1992). The work of Semino et al. (1989) tested for different characteristics to trace mitochondrial DNA, leading them to suggest that the frequency of gene flow from Africa may exceed the flow between Sicily and the peninsula (see Rando et al.

1998). Obviously further studies with more focused and standardized methodologies are in order.

A more sharply defined shift in the biological composition of a population might be recognized at Mozia, the first Punic colony. This island in the shallow lagoon on which modern Marsala is located is where the colonial occupation began, later expanding onshore to Lilybaeum (modern Marsala). The colony came to an abrupt end in 397 BCE (see also, below). In that year Dionysius of Siracusa, the Greek settlement on the eastern end of Sicily, broke through the Punic defenses and "destroyed" the city. The extent of this detruction remains uncertain since no clear break can be demonstrated in occupation or in burials in the huge necropolis that extends out from Lilybaeum. The extent of biological change that may, or may not, have resulted from this significant and rapid shift in political orientation has not been documented here, nor from other contexts such as at Satricum in Campania (Becker 1994) where the written record had lead scholars to suggest that biological change might be detected.

Given these problems of sample size for intact crania on Sicily, as elsewhere, four alternative approaches to this problem of biological distance studies also may be considered. These four categories employ variations of the better known traditional methods of study.

1. Non-metric analyses:

Many of the non-metric cranial traits (see Manzi and Vienna 1997) that are generally considered useful in identifying populations derive from portions of the skull which are the most subject to erosion such as the basilar area and the face (see Berry and Berry 1967). Others derive from portions of the skull which are highly likely to be preserved even when only fragments of the skull are recovered, such as from the frontal and parietal regions (see Berry and Berry 1967). Careful recovery and curation of cranial remains, particularly from collective graves and cave sites, may permit the characterization of local populations with some degree of reliability (cf. Becker 1996a).

Early recognition of the associations between discontinuous cranial traits (Hertzog 1968, also Benfer 1970) provided clues regarding how these studies might be conducted. Computer technology now enables us to examine variations in individual non-metric traits with some facility, revealing in some cases the presence separate yet proximal populations (e.g. Hauser and De Stefano 1985, 1989). Bondioli and his colleagues (1986) use non-metric data to define, *ex post facto*, family groups at Alfedena in the Abruzzi. The remains from Alfedena have been recovered and curated with particular care, and thus form a major skeletal population for study for which there is as yet no equal on Sicily.

Traits identified as common in central Italy, such as the lateral incisor trait (LIT) discussed by Pinto-Cisternas et al. (1995; see also Becker and Salvadei 1992), also appear among the Sicels and other populations native to Sicily. The LIT also has been noted with a relatively common frequency among medieval populations in the Czech Republic (Becker 2000b). The LIT as well as incisor 'shoveling' (see Portin and Alvesalo 1974) and other dentil characteristics merit specific attention as possible means by which the impact of Greek, or Punic, "biological" colonization of Sicily might be viewed. What remains to be seen is a study focused on such non-metric traits specific to Sicily, and charted by time and space (cf. Sokal et al. 1989).

2. Dental analyses:

The problems with the preservation and recovery of skeletons discussed above and noted as common throughout the Mediterranean have led some scholars to focus their attempts at population characterization on the available dentition. Since dental crowns are generally the best preserved portion of the human skeleton, the diameters and morphological details preserved provide considerable potential for recognizing biological differences between local populations (see Goose 1963, Coppa and Macchiarelli 1982, Rubini et al. 1992). Odontometrics provide an evaluation technique distinct from the non-metric dental traits noted above under Section 1,

but both should provide complementary and confirming results. Note also should be made that techniques for recovering DNA from teeth provide us with considerable potential for future studies (see following).

3. Paleonutrition and Paleodietary Studies.

This area of research (see Ambrose and Katzenberg 2000) is one of the fastest expanding sectors of biological studies, particularly in peninsular Italy (e. g. Bartoli 1996, also see Salvadei et al. 2001). Stress and health variables as revealed by evidence from throughout Italy, incorporating the very sparce data from Sicily, are discussed by Minozzi et al. (1994). As with most of such broadly targeted studies, the evidence from one site often contradicts that from another. These difficulties have long been a feature of paleodemographic research (cf. Angel 1969). Methodologies continue to improve and prospects remain good. While various attempts have been made in the past to explore paleonutrition using Sicilian skeletal populations (Fornaciari and Bartoli 1995) the results are not impressive. Results that suggest a high protein diet (e. g. Bartoli et al. 1996) need not indicate a herding economy, and fish and mammalian sources are not considered.

As noted earlier, nutrition is commonly believed to correlate with stature (see Becker 1999a), rendering the calculation of the average stature of a population one of the more interesting aspects of skeletal studies. Unfortunately no agreement has been reached regarding which of the many sets of formulae available for the calculation of stature should be used with any particular population. Thus the presentation of basic metric data becomes essential to any skeletal study. The use of multiple formulae, averages taken from this approach, or various statistically meaningless calculations (e.g. Leighton 1999: 34-38, 270, Table 3) retards the achievement of the common goal of understanding the past.

4. Health Status: The Transition to Modern Research Programs

Studies of the health of ancient peoples tend to focus on individuals suffering from easily recognized disorders that leave traces on the bone or on early literary records. The written records are difficult to decode since the descriptions of "plagues" and other illnesses are insufficiently clear to allow precise evaluations. The vast literature describing various types of disease in antiquity often notes the presence of "malaria." The possible presence of malaria in ancient Sicily and elsewhere, particularly in marshland regions, is not matched by any certain biological evidence from the bones (cf. Borza 1979). Despite Angel's (1966, 1967) early assertions regarding a high incidence of malaria among ancient Mediterranean populations, there has been no confirmation of this thesis through skeletal studies. Borza (1979: 118-119) had used evidence from Macedonia to cast doubt on Angel's thesis, and subsequent research has upheld Borza's insights. More significant was Borza's concern with the problematical methods used by Angel in those studies. In this regard Borza also set important standards for the interpretation of the skeletal evidence from any context.

Collin-Bouffier (1994) specifically points out that for the western Greeks there is a nearly total lack of evidence that malaria was ever a significant health hazard. Studies of human skeletons from the colonial period on Sicily (e.g. Becker 1981a, 1981b, 1985, mss. A, D, E; see also Brown 1980) rarely note even a single individual with any porotic hyperostosis or any other skeletal markers that might point to a chronic anemia related to malaria. Nor can we document at this time the effects of sieges on the health of a defending population (see Villard 1994).

The literary evidence describes numbers of plagues and also presence of chronic disorders in antiquity (see Ginouvès et al. 1994). The various ancient attempts to cure these problems also are noted frequently in the historical record (e.g. Broise 1994). The epidemics reported from Siracusa in 413, 396 and 212 BCE are all well "documented" in the ancient literature (see Villard 1994), but recognizing which diseases were involved from the skeletal record is not a simple task. Even the present use of polymerase chain reactions (PCR) to identify traces of specific disorders has yet to offer new insights into ancient health status of any population. Prior to the

advent of modern medicine, ca. 1950, all of the world's populations were subject to vast numbers of chronic disorders (cf. Nastasi et al. 1991), few of which are detectable in the skeletal record.

Modern studies of contemporary health and disease on Sicily reflect the most recent developments in medical research in Italy and elsewhere in the European Union (e.g. Giuffrida et al. 1999). Relationships between specific genetic polymorphisms and longevity in a Sicilian population are but one of the interesting studies now in process (Lio et al. 2002; cf. Mazzetti et al. 1988). This new aspect of human biological research, largely using various aspects of DNA evaluation, has led to a proliferation in programs in which Sicilian populations have become the focus of all aspects of genetic and disease related investigations (cf. Torroni et al. 2000). Studies include cases where specific island-related populations are reviewed as well as those in which a Sicilian sample is part of a national or trans-national review. DNA studies now aid in the diagnosis of unusual diseases in Italy (Cancrini et al. 1998, Marinucci et al. 1982) as elsewhere in the world. Many of these modern medical studies incorporate Sicilian subjects simply because the researchers are based as Sicilian universities. Other studies by medical researchers based on Sicily test genetic markers that appear on the island with the results that in no way note any special characteristics appearing in subsets of the Sicilian population as a whole.

A recent study of the epidemiology of multiple sclerosis on Sicily (Savettieri et al. 2001) suggests the possibility that this disorder relates to a medieval migration from northern Europe (cf. Elian et al. 1987, Poser et al. 1994). Other research directed at the infections associated with cystic fibrosis (Agodi et al. 2001; aslo Agodi et al. 2000) have similar implications for reconstructing the genetic history of the island. The island's relative isolation also is seen as useful in studies of the genetic diversity of tuberculosis (Sola et al. 2001). The close connections with peninsular Italy that is revealed in other studies (Filla et al. 1999) does not negate the recognition that some types of genetic disorders (see Stroppiano et al. 1999) are concentrated within this island population (also Gatti et al. 1997). Certain genetic disorders identified outside Sicily, such as Gaucher disease (GD), have been traced "genetically" to possible origins on the island (Cormand et al. 1997; see also Cefalù et al. 2001).

Comparative studies with Italic and other Mediterranean populations reveal that interesting characteristics are concentrated on Sicily, including a set relating to insulin metabolism (Pizzuti et al. 2002). More commonly studied are processes relating to thalassemia (Cooley disease) and related anemias (see De et al. 2002; Lacerra et al. 2002; Perrin et al. 1998; Cacopardo et al. 1998; Fichera et al. 1997; Mirabile et al. 1995; Di Marzo et al. 1988; Musumeci et al. 1979). Some of the earliest studies involving DNA restriction enzymes identified the range of differences among sickle cell anemias on Sicily (Bertero et al. 1984, see also Sandler et al. 1978). The great heterogeneity among the molecular defects of thalassemia within the modern Sicilian population (Giambona et al. 1995) is not surprising in light of the diversity in backgrounds of the present population (also Maggio et al. 1986; Lombardo et al. 1986; Troungos et al. 1985).

Findings on Sicily of single examples of rare disorders such as Karposi's sarcoma (Zong et al. 2002) form a small but important part of the mosaic of DNA studies (see also Mirisola et al. 2001; Anello et al. 2001). Mutations of genetic systems also are seen in Sicily that appear unrelated but parallel to genetic disorders noted elsewhere, such as in Holland (Verhoeven et al. 1999). These very specific findings may be related to worldwide random mutation, but now form a very small part of the research using these new techniques (cf. Campo et al. 2001).

Two major approaches are now available for the study of the biological and cultural history of Sicily. First we have traditional osteological methods. Now a second approach using the broad range of molecular studies is being developed. Molecular biology may provide broader coverage and thus a more detailed set of revelations as well as important means by which the more traditional osteological studies may be expanded and verified.

ABSTRACT

Il popolamento della Sicilia: studi di campioni scheletrici umani e di biologia umana dal Paleolitico ai tempi moderni

Riassunto – La ricostruzione del popolamento antico della Sicilia non può prescindere dalla considerazione di una serie di eventi ad essa strettamente correlati come il contributo bio-popolazionistico dovuto alle colonizzazione greca e punica. Questi aspetti sono stati presi in considerazione nel presente lavoro anche se non integrati con le informazioni attualmente disponibili. Studi su campioni scheletrici umani di provenienza archeologica e l'uso di nuove metodologie, come quelle relative all'analisi del DNA, possono fornire valide risposte a specifiche problematiche archeologiche. Una raccolta dettagliata dei dati di biologia scheletrica disponibili risulta, in tal senso, utile per la comprensione delle dinamiche delle popolazioni antiche e dei loro riti funerari, nonché per l'individuazione di fenomeni particolari come i sacrifici umani. Simili studi rappresentano una messa a punto dettagliata delle conoscenze relative alle complesse dinamiche bio-culturali che si verificano all'interno di una specifica regione geografica o nell'interazione tra regioni differenti. I pochi studi condotti, negli ultimi venti anni, su campioni scheletrici umani siciliani hanno incontrato tutte le difficoltà tipiche delle attività di ricerca condotte in paesi come l'Italia o la Grecia, prime tra tutte la mancanza di fondi e la scarsità di materiale scheletrico idoneo a progetti di ricerca elaborati. La penuria di collezioni scheletriche sufficientemente numerose e di informazioni relative alla loro distribuzione temporale e spaziale impedisce di comprendere se le patologie relative all'attività fisica, lo stato di salute dentaria, lo stato di salute generica e la frequenza di determinate malattie sia correlata a dinamiche popolazionistiche locali o a variazioni statistiche dovute alla scarsa rappresentatività dei campioni scheletrici esaminati. Le ricerche di biologia delle popolazioni umane antiche in Sicilia sono fortemente penalizzate dai problemi suddetti. Piccole collezioni scheletriche si prestano a studi basati sulla determinazione del sesso e dell'età alla morte, che risultano cruciali per le interpretazioni archeologiche, oppure possono fornire informazioni puntuali relative a singole patologie connesse con particolari stili di vita. Per esempio l'alta frequenza di spondilite anchilosante e di artrite reumatoide documentata in una popolazione dell'isola è stata messa in relazione allo sviluppo di centri urbani nella regione, precedentemente occupata da piccole comunità agricole isolate. I possibili effetti dell'urbanizzazione sulla biologia e sullo stato di salute possono essere testati mediante la creazione di un database scheletrico di provenienza archeologica. In lavori precedenti questo processo è stato confrontato con quello, probabilmente similare, relativo alla comparsa della sifilide, in cui lo spirochete *Treponema pallidum* potrebbe essere uno dei molteplici agenti che producono differenti sintomatologie in differenti ambienti. La comparsa della lebbra in Africa a partire dal secondo secolo a.C. solleva il problema della sua successiva trasmissione in Europa. La lebbra divenne molto diffusa in Europa a partire dal Medioevo e si può ipotizzare che il passaggio di questa malattia a partire dal Medio Oriente e dall'Africa sia avvenuto attraverso la Sicilia. Le indagini sui contatti e sui cambiamenti culturali possono rappresentare una chiave di lettura dei possibili effetti biologici conseguenti alle interazioni tra gruppi umani. Anche i problemi relativi alle modalità con cui una malattia insorge e si manifesta, conseguentemente allo sviluppo di un nuovo ambiente socio-culturale, possono essere adeguatamente investigati mediante l'uso di un database simile a quello creato per la Sicilia. Ricerche recenti suggeriscono che i nascenti chiefdoms dell'età del Bronzo Medio (MBA) fino a quelli dell'età del Bronzo Tardo (LBA), avessero una complessità gerarchica più ampia di quella documentata per le comunità dell'età del Ferro. Questo sembrerebbe contraddire la tradizionale ipotesi di aumento della complessità sociale durante gli ultimi millenni. Sebbene la crescita socio-politica verso una maggiore complessità non sia sempre una regola, la supposizione di comunità tribali egalitarie durante l'età del Ferro si basa su una particolare interpretazione dei pattern funerari. Per una società egalitaria, in cui è probabile una equa divisione del

cibo come di altre risorse, sono attese limitate variazioni di statura. Ampie variazioni di statura sono, altresì, pensabili per società fortemente stratificate e suddivise in classi. Tale ipotesi non è stata testata sul database siciliano, ma fornisce un utile modello di ricerca. È necessaria tuttavia una certa cautela. Questo modello presuppone, infatti, che nell'Età del Ferro le sepolture elitarie non fossero posizionate in qualche luogo lontano dalle necropoli oggi note. Con il presente lavoro si vorrebbe poter affermare che il crescente numero di studi sulla biologia scheletrica delle popolazioni siciliane, fornisca evidenze utili nella definizione del tipo fisico, dei cambiamenti nella statura, della dieta e della distribuzione delle patologie di interesse generale in studi di carattere culturale. Il presente database offre, tuttavia, un sostegno molto limitato che permette considerazioni conclusive puramente ipotetiche. Lo studio estensivo dei campioni scheletrici mesolitici di Grotta dell'Uzzo rappresenta un ottimo punto di riferimento in questo ambito. In Sicilia è documentata una graduale riduzione della statura nel passaggio dai gruppi di cacciatori paleolitici ai tempi moderni. Sembra che gli abitanti della Sicilia abbiano dovuto pagare un prezzo per i benefici connessi alla comparsa dell'agricoltura, e la conseguente urbanizzazione: la costante diminuzione della statura è chiaramente documentata dal record (sebbene numericamente limitato) a disposizione. Si può ipotizzare che ciò sia connesso con il cambiamento nella dieta, caratterizzata da uno scarso apporto di proteine animali, e con l'aumento delle malattie infettive. Studi basati sull'analisi degli elementi in traccia possono confermare il cambiamento nella dieta, mentre analisi paleopatologiche possono verificare una maggiore incidenza nelle patologie sul record scheletrico. Occorre non solo aumentare il numero di ricerche in questi ambiti, ma anche estendere le collezioni scheletriche in modo tale da fornire validità statistica agli studi futuri. Un valido studio di biologia scheletrica, allo stato attuale, potrebbe sostituirsi a tutte le ricerche, di scarsa rilevanza, condotte negli ultimi cento anni. Il notevole sviluppo delle attività di ricerca condotte in Sicilia fornisce una base importante per la determinazione delle sequenze cronologiche della regione. Resti scheletrici umani provenienti da sepolture o contesti simili possono, infatti, essere posizionati, con estrema precisione, all'interno di una cronologia relativa. Mediante i risultati delle ricerche condotte nell'ultimo secolo e gli scavi in corso sarà possibile costruire un campione scheletrico in grado di fornire risposte adeguate a molte delle problematiche aperte relative a questa importante isola al centro del Mediterraneo.

Parole chiave – *Biologia umana, Osteologia, DNA, Sicilia.*

APPENDIX I

Giustiniano Nicolucci (1819-1904) and the study of human biology in Italy: relations to early modern physical anthropology on Sicily

The impressive efforts of Francesco Fedele and his colleagues (Fedele 1985b, Fedele and Baldi 1988) have provided us with considerable information regarding the life and achievements of Giustiniano Nicolucci. Although Nicolucci came from central Italy and had his principal associations with the University of Naples, his academic life reflects important contacts that extended from Sicily to America. The wealth of information now available enables us to understand one of the major personalities who played an important role in the 19th century development of anthropology in Italy. Nicolucci was born in Isola di Liri (Frosinone), in the Liri Valley south of Rome, on 12 March 1819. As a son of a noted local family he was sent to be educated at the prestigious University of Naples. There is no evidence that he ever set foot on Sicily, yet his anthropological studies included a study of a Phoenician skull from Sicily (Nicolucci 1865b) and other research that had considerable bearing on the discipline as it related to the intellectual history of the island.

Nicolucci studied medicine and natural history, and is believed to have received his degree in 1845. Even prior to completing his *laurea* he had published some two

dozen articles on various aspects of anatomy, pathology, general zoology and botany (Baldi 1988: 27-35). Of note is the fact that his thesis topic, or its published form, remains unclear in the publication list offered by Baldi. Perhaps more important is the nearly complete shift in the focus of his research shortly after the completion of his studies. Nicolucci, as many others trained in medicine at that time, turned his attention to human biology as it related to evolution in an effort to reconstruct the histries of the various "races" (read "peoples") of Italy.

The publication of Nicolucci's two volume *Delle Razze Umane*, in 1857 and 1858, reflects the extent of his interest in research and publication in the area that later was to become "anthropology." His survey of the biological evidence delineating all contemporary populations ("*Razze*") was an attempt to understand the peoples of the world in the mode then common; equating biology and culture (cf. Retzius 1860). Nicolucci's focus on human biology developed rapidly and remained strong, being supplemented with archaeological interest such as typified the comprehensive view of Italian proto-anthropologists of the 19th century. By the end of the 1860s Nicolucci was one of the foremost Italian scholars who, in parallel with their contemporaries in other modern nations, were attempting to use human biology in their efforts to reconstruct the cultural history of the recently unified nation. Nicolucci's survey of human "races," published about the same time as Darwin's *Origin of Species* (1859),reflected the widespread interest among scholars and intellectuals in piecing together the history of modern "races" throughout Europe. Thus their efforts to identify the various sub-species of *Homo sapiens* began a line of research that remains as active today as it was nearly 150 years ago.

Copies of Nicolucci's many publications remain difficult to locate, and a complete bibliography of his considerable output has yet to be assembled. During the course of her extensive work with the museum collections in Naples, Morris (1988: 253) made a serious effort to gather "a more or less complete set of Nicolucci's publications" through the extensive use of photocopies. A good bibliography remains to be published, and until this task is completed we have available only Baldi's (1988: 27-35) transcription of Abele De Blasio's 1905 tabulation that had been collected for Nicolucci's obituary. The De Blasio version lacks significant details relating to most of Nicolucci's publications that are cited, and as Morris discovered, the originals are difficult to locate even when complete citations are in hand.

The Morris listing of Nicolucci's publications, despite the effort and care that went into its production, remains problematical for a number of reasons. A principle problem is the lack of details such as page numbers. The organization by subject rather than dates of publication also slows research. The section on "*Antropologia*", however, provides an idea of the extent of Nicolucci's work and the ways in which he integrated archaeological studies with those of physical anthropology. Shortly after the publication of *Della Razze Umane,* Nicolucci published a significant paper on stone tools in southern Italy and the peoples who made them (Nicolucci 1863). Significant in this 1863 publication is the inclusion of craniometric data, reflecting contemporary attempts to link skull shapes with specific cultural groups.

On 6 October 1863 Nicolucci read a paper covering the cultural and biological history of the Ligurian "race" that was published in the *Atti della Reale Accademia delle scienze*Ö, probably in Naples (but note some of these papers were read in Torino). This 1863 paper, "*La stirpe ligure,*" was reprinted with its seven exquisite plates in Naples during the following year (Nicolucci 1864a). This pattern appears to have been common at the time; papers were read at scholarly meetings and perhaps published in the proceedings of those meetings, and then extracted for distribution. The terms "offprints" or "reprints" commonly used for extra copies made by the publishers of specific articles from journals today is still translated by the Italian *estratti* (extracts). Copies of the papers that were part of the proceedings of these early professional meetings continue to be rare. More problematical is the fact that extracts and often considerably altered versions of these papers were separately published and distributed. These revised versions frequently are found today in public and private libraries throughout Italy.

Nicolucci's writings reveal the locations and extent of Italian collections of human skulls already assembled by 1863 (cf. Micali 1832). The then available literature on human skeletal research is well documented in Nicolucci's extensive bibliography. Catalogues of human cranial collections, such as that of Gastaldi (1865) and the catalogue of the famous J. B. Davis (1867) collection in England, appear to have been in Nicolucci's library (1864, 1869: 51, notes 1 and 2). These catalogues would have been in the libraries of all contemporary scholars then interested in human evolution and culture history.

La stirpe ligure includes the seven detailed plates providing full scale views of human skulls, including three plates (I-III) depicting two *antico* examples. Unfortunately, the contexts from which these skulls derived are not specified in the 1864 version. The origins and antiquity of at least one of these ancient skulls published in the 1864 "reprint" is noted as having been discussed in the *Atti – Napoli* (Volume I), from which this 1864 publication appears to be derived rather than directly reprinted. Thus the reprinted version, using the same plates for the illustrations, may have had an altered text and at least some of the information in the original had been excluded.

Nicolucci's tour de force of Ligurian "racial" history remains impressive for a number of reasons. Perhaps of primary note is the extent to which 19th century scholars such as Nicolucci were in communication with colleagues across the world (cf. Fedele 1988b) or were informed of related research in their fields of interest. This is long prior to the development of specialized areas of study such as archaeology, and immediately preceding the formation of specialized scholarly societies. Thus Nicolucci was extremely well informed regarding the relevant literature on the Stone Ages and the sequences of stone tool use that had been worked out in Scandinavia and then in other parts of Europe.

In the same year that Nicolucci published *La stirpe ligure* he also published his only paper specifically relating to the physical anthropology of Sicily. This study of a "Phoenician" cranium from excavations near Palazzo Acreide (Nicolucci 1865b) suggests that the skull had been sent to him by a colleague. This skull may still exist among the Nicolucci material now in Naples (see Morris 1988). Most of the archaeological material in public hands that had been excavated in the vicinity of Palazzo Acreide is to be found in the *Antiquarium* of that town.

A single paper focusing on archaeological materials from the New World (Nicolucci 1884) happens to be a description of stone tools from eastern North America. The possible presence of these artifacts in Italy reflects the interchanges of information that characterized museology and science after the middle of the 19th century. In the Peabody Museum at Harvard University there is a small collection of stone tools from Pennsylvania and New Jersey (cat. Nos. 72-21-10/6387-6390) either collected by or for Nicolucci, but donated to the Museum by Col. Theodore Lyman. Most of the artifacts comprising Lyman's gift consists of archaeological specimens from Italy.

Nicolucci's New World contacts also were linked to Harvard University. The Harvard connection is indicated by a reprint that he sent to Cambridge that now can be found at the Tozzer Library. At least one cast of an Italian skull was sent by Nicolucci in 1872 for the Peabody collections (Peabody Museum cat. No.72-21-10/6498). These data can be found in the acquisitions ledger entry, but the present lack of a catalogue card as well as the cast itself suggests that this item was not or no longer is housed at the Peabody Museum (Michele Morgan, pers. comm. 23 Aug. 2001). Whether any New World items were sent to Italy in exchange is not now known, but numbers of items from North America are in various collections in Naples. The original cranium from which the cast was taken came from the village of Isola di Sora, some kilometers inland from Naples. Apparently, after his return to his family's estates Nicolucci had continued his correspondance with colleagues around the world. Nicolucci's (1871) description of a skull found on his home on the island of Liri was followed by his presentation of the cast of this cranium to Harvard, probably along with a copy of his 1871 description of the skull. This reprint (Nicolucci 1871) now is in the Tozzer Library.

The Nicolucci collection of 166 crania and skeletons, ancient and modern, that now forms a part of the holdings of the Museum of the Royal College of Surgeons of England, located in London, had been purchased in 1870 (Quigley 2001: 141). The 166 individuals represented are said to derive from both Italy and Greece, and we may infer that at least some portion of these remains come from Sicilian contexts. Puccini (1991: 506) suggests that some of Nicolucci's collection had been sent "to the Hunter Museums of London." I had thought that the Hunterian Museum at the University of Glasgow was intended, but reviewers agree that the Royal College of Surgeons in London is correct.

Of considerable importance in these studies were the systematic mining of Etruscan tombs, an activity that represented "archaeology" as it was conducted in the 19th century. This "mining" appears to have increased during the 1860s (see Nicolucci 1869: 1-10). These searches for artifacts, a process that formed the focus of "archaeology" as it then was practised, also yielded considerable numbers of human skeletons. However, all but the most complete skulls were routinely discarded as uninteresting materials that just happened to be in these tombs. This attitude continues to operate throughout much of Italy today, reflecting the survival of traditional archaeological goals and methods as well as the scant impact on these traditions by laws as well as the increasing presence of a few skilled physical anthropologists (cf. Siapkas 2001).

Despite increasing numbers of skeletons discovered after 1860, the numbers of "perfect" skulls that were deemed worthy specimens that should be preserved remained low. Thus most of the "skeletal" studies of that period and for decades after review but a a few crania, often with vague if any provenance. Micali's (1832) three volume history of the "Italian people" provides tabulated data from only 19 skulls of which 18 were believed to have been male. The proveniences of these skulls were given as the "collections" in which they were held, with only indirect if any reference to where they had been recovered. Thus one skull, noted by Micali as in the Museo Ant. Della R. Accademia Medico-Chirurgica di Torino, is noted as from Vejo (Veio). Another, from Cere, was in the Museo di Zoologia ed Anatomia Comparata dall'Università di Roma. The other 17 skulls, according to Micali (1832), had been in the private collection of Prof. Maggiorani, but by 1832 some of these 17 may have been in the Collezzione Antropologiche della R. Accademia Medico-Chirurgica di Torino. Nicolucci (1864: 36, n.1) states that Maggiorani held ten crania (5 Roman and 5 Etruscan) in his personal collection, but Nicolucci later suggests that Maggiorani held 15 or more skulls (a number closer to the 17 indicated by Micali).

Human skulls rarely if ever appeared in Cabinets of Curiosities prior to the 1800s. During the early 19th century the emerging public awareness of the great antiquity of the earth and the considerable period of human evolution that was part of that history, led to attempts to reconstruct human development in biological as well as cultural terms. The study of human evolution through the reconstruction and direct evaluation of human skeletal remains led to greater interest in preserving examples from all periods of the past.

The "recent" biological history of human populations, such as that of the "Ligurians," remained closely tied to the "historical" record as it then was known. Maggiorani (1858, 1862) had already made efforts to evaluate Roman and Etruscan skulls prior to Nicolucci's general efforts. Nicolucci (1864: 6-16) provides a careful review of the classical literature in an exemplary fashion (cf. also, Nicolucci 1869: 11 ff). During the 19th century, and even throughout much of the 20th, these texts were accepted uncritically as valid records of the past. During the past 50 years these ideas continued to be promulgated, but only by those scholars who remained frozen in the classical tradition (see Siapkas 2001). Another facet of 19th century "historical" studies was the attempt to understand written records from the distant past through philological enquiry. Thus Nicolucci (1864: 16-24) follows his intensive historical study of the Ligurians with an equally exhaustive review of the philological literature.

Today all serious scholars recognize that the vast majority of these ancient texts are far from being contemporary accounts, and that they need to be evaluated with

modern understandings of the analytical approaches that relate to both history and folklore. In 1864 careful scholars such as Nicolucci assembled detailed and well referenced records that they believed were relevant to subjects such as the "origins" of the Ligurians and others.

Nicolucci's interest in the Ligurians appears to reflect his general interest in supposed human migrations into peninsular Italy (Nicolucci 1864: 61-67). In his efforts to understand these processes Nicolucci provides a master table in which he lists craniometric data from some 30 skulls. Extensive measurements plus details of their origins are offered for three skulls of ancient Ligurians, including one recovered in 1837 from Cadelbosco di Sopra (Nicolucci 1864: 27-32). These three are compared with seven skulls of modern Ligurians (4 from Liguria and 3 from Piemonte), ten ancient Italic skulls (of which examples from Veji (Veio) and Perugia are Etruscan), and ten other modern Italian skulls. The Veji (Veio) skull may be the skull that Antonio Garbiglietti received from Rome when he served as the physician for the "R. Casa di S. M. la Regina vedova Maria Cristina di Sardegna" (Nicolucci 1869: 29-30, Garbiglietti 1841). That skull came from a tomb at Vejo opened on 17 May 1839, with the skull being noted as the only part of the skeleton that was recoverable.

The small sample size and absence of statistical analysis doomed this study, as hundreds of others since then, to a meaningless morass of data. Garbiglietti (1862) had already noted difficulties with this line of research, and soon after Nicolucci also moved on to other, more productive studies. However, the gathering of these kinds of craniometric data remained a central if unproductive avenue for research for many decades to come. Modern computer analysis may enable us to utilize some of these old records, once we establish from existing skulls that the measurements of that period were relatively accurate.

Nicolucci remained an independent scholar for much of his life. His teaching appointment at the University of Naples began in 1880, when he had reached the age of 61 years. While on the faculty at Naples he wrote an impressive study of the crania that had been recovered from the extensive excavations at Pompeii (Nicolucci 1882), as well as a survey of the anthropology of Italy (Nicolucci 1887) that predates this effort for Sicily by more than a century. Nicolucci's nation wide survey expanded on his earlier, region specific work such as his study of the physical anthropology of Etruria (1869).

Giustiniano Nicolucci was a classic example of the gentleman scholar of the 19th century. However, he proposed no vast general theories, nor did he produce students who went on to do greater things. Physical anthropologists in Italy continued to be interested in human evolution, but were quietly disassocuated from archaeological studies. As we can see from scholarly trends in Sicily, the original ideas that craniometrics could provide confirmation for migration theories and help to elucidate culture histories remained undemonstrated. By the time of Nicolucci's death, in 1904, physical anthropology in Sicily and in many parts of Italy had become marginalized to the study of archaeology. Not until the very end of the 20th century, with the introcuction of new technologies, do we see physical anthropology re-entering the area of research linked with archaeology.

Nicolucci has been described as belonging "more to the 18th-century school of erudite encyclopedism than" to any of the late 19th-century trends (Puccini 1991: 506). However, one might also view him more as a Boasian particularist, gathering information about humans without fashioning elaborate and non-productive theories. After Nicolucci's death another two decades were to pass before Malinowski made his contributions to ethnographic method and anthropological theory. Until that time all of anthropology was searching for means by which data could be organized and cultures understood. Many more years were to pass before anthropologists used the data sets to produce effective, predictive theories regarding human behavior. Nicolucci did not live to see any of this, but he had made his contribution to the field and serves as an important link with 19th century research.

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